

HSL No. 73-10

MAY 31, 1973

THIS ISSUE CONTAINS:

HS-012 584-HS-012 643

HS-800 737; 754; 757; 765; 772

781; 796-798; 802-804; 817

HS-840 020-023

U.S. Department of
Transportation

National Highway
Traffic Safety
Administration



*Shelve in stacks
S.B.T.*

Highway Safety Literature

... A SEMI-MONTHLY ABSTRACT JOURNAL

AVAILABILITY OF DOCUMENTS

Documents listed in **Highway Safety Literature** are **not** available from the National Highway Traffic Safety Administration. They must be ordered from the sources indicated on the citations, usually at cost. Ordering information for each of the sources is listed below.

NTIS: National Technical Information Service, Springfield, Va. 22151. **Order by title and accession number: PB, AD, or HS.**

GPO: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. **Give corporate author, title, personal author, and report number.**

Corporate author: Contact corporate author.

Reference copy only: Consult your librarian.

See serial citation: Obtain through normal loan or purchase.

SAE: Society of Automotive Engineers, Dept. HSL, 2 Pennsylvania Plaza, New York, N.Y. 10001. **Order by title and SAE report numbers.**

HRB: Highway Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

Material directly related to Highway and/or Motor Vehicle Safety is solicited for inclusion in Highway Safety Literature. Topics must fall within the scope of the mission of the National Highway Traffic Safety Administration. Submit material, together with a written statement of approval for publication to:

Office of Administrative Services (N48-50)
National Highway Traffic
Safety Administration
400 7th Street, S.W.
Washington, D.C. 20590

 Please indicate availability source and price for the material.

Special notice: Material published in HSL is intended only for information. References to brand names, equipment models or companies does not imply endorsement by the NHTSA or the U.S. Department of Transportation.
U. S. SUPT. OF DOCS.

Entries in **Highway Safety Literature** are arranged in numerical order by HS accession number. Documents related directly to the National Highway Traffic Safety Administration (NHTSA) are numbered according to the following series: Accident Investigation Reports HS 600 000; Compliance Test Reports HS 610 000; Contractor's Reports HS 800 000; Staff speeches, papers, etc. HS 810 000; Imprints HS 820 000.

A document containing several articles is announced as complete volume under an HS number referring to it as a whole. Entries for individual articles are listed under their own HS numbers.

SAMPLE ENTRIES

JOURNAL ENTRY

Title of Document { **SYNTHESIS OF CASE LAW JURISPRUDENCE RELATING TO WET-WEATHER HIGHWAY CONDITIONS**

Journal Citation → Highway Research Record n 376 p29-36 (1971)
D. C. Oliver 1971

Author(s) → Sponsored by Highway Res. Board Steering Com. for Workshop on Anti-Skid Program Management and presented at the workshop.

Search Terms { Descriptors: *Liability, *Negligence, *Accident responsibility, *Legal responsibility, *Wet road conditions, *Court decisions, *State government, *Skidding accidents, *Warning signs, *Highway maintenance, *Litigation, *Icy road conditions,

Abstract { The extant case law on legal liability for accidents occurring on icy and wet highways has established three central areas and one subarea in the jurisprudence of maintenance liability. These areas are compliance with general duties in order to escape liability; damages resulting from noncompliance (negligence); contributory negligence as a bar to recovery; and advisory signing as a technique in meeting general duties. Court decisions covering these four areas are presented.

NHTSA Accession Number → HS-012 289
*Subject heading in Subject Index

CONTRACT REPORT

EQUIPMENT AND PROCEDURES FOR MEASURING GLARE FOR MOTOR VEHICLES. FINAL REPORT

Corporate author → Teledyne Brown Engineering
N. E. Chatterton J. D. Hayes E. W. George 1972 102p
Contract DOT-HS-089-1-139

Availability → NTIS

Descriptors: *Glare, *Glare reduction, *Visual perception, *Photometers, *Luminance, *Hydraulic equipment, *Central vision, *Field of view, *Backgrounds, *Contrast, *Light conditions, *Brightness, *Test facilities, *Test equipment, *Vehicle safety standards, *Simulators, *Light, *Reflectance, *Measuring instruments,

A procedure and description of equipment for measuring glare from a driver's own vehicle are presented. The procedures are based on a disability glare theory as applied to foveal vision. Two pieces of apparatus were constructed to provide the measurement capability. One of them simulates diffuse sky glare and the other simulates direct solar glare. Methods of combining data from these measurements are presented along with scaling laws selected to provide a value for glare as it would be under natural daylight conditions. A standard for allowable glare levels from the vehicle is developed which is independent of the measurement apparatus. Test results from a passenger car are presented and compared with this standard. Recommendations for improvements to the apparatus and additional research requirements for improvement to the theory are made.

HS-800 731

*Subject heading in Subject Index

1. ACCIDENTS

1A. Emergency Services

TRAFFIC CRASH CONTROL AND CLEANUP. VOL. 1. TRAFFIC CRASH PROCEDURES

Smith (Wilbur) and Associates, S18600

Prepared for Virginia Hwy. Safety Div. in cooperation with National Hwy. Traf. Safety Administration. Condensation of HS-012 627.

Corporate author

*Emergency services, *Postcrash phase, *Debris removal, *Emergency traffic control, *Hazardous materials, *Accident location, *First aid, *Fire extinguishers, *Manuals, *Accident factors, *Virginia,

This manual is designed to familiarize individuals involved in traffic accidents with procedures and policies designed to minimize post traffic accident/incident problems. Procedures are outlined for securing the accident scene, notifying authorities, handling hazardous materials, giving first aid, and removing accident debris. A table of hazardous materials, commonly transported by trucks, is included which indicates the seriousness, type of hazard, actions to be taken, first aid, health hazards, flammability, instability hazards, oral toxicity rating, action on skin, and fire extinguisher requirements for each substance.

HS-012 626

TRAFFIC CRASH CONTROL AND CLEANUP. VOL. 2. ADMINISTRATIVE GUIDE FOR POST TRAFFIC CRASH/INCIDENT PROCEDURES

Smith (Wilbur) and Associates

Prepared for Virginia Hwy. Safety Div. in cooperation with National Hwy. Traf. Safety Administration.

Corporate author

*Emergency services, *Debris removal, *Postcrash phase, *First aid, *Emergency traffic control, *Government employees, *Accident location, *Hazardous materials, *Emergency equipment, *Fire extinguishers, *Virginia, *Directories, *Manuals,

This manual provides a catalog of information and procedures for use during postcrash/incident cleanup of motor vehicle accidents or other highway related incidents involving debris on streets and highways. Procedures are briefly outlined for securing the accident scene, notifying authorities, handling hazardous materials, giving first aid, and removing accident debris. A directory of federal, state, local, and private agencies in Virginia related to debris hazard control is included. A table of hazardous materials is also included which indicates the seriousness, type of hazard, actions to be taken, first aid, health hazards, flammability, instability hazards, oral toxicity rating, action on skin, and fire extinguisher requirements for each substance.

HS-012 627

DEBRIS, HAZARD CONTROL AND CLEANUP. VOL. 3. A REVIEW AND EVALUATION OF CURRENT

PRACTICES RELATED TO DEBRIS HAZARD CONTROL AND CLEANUP

Smith (Wilbur) and Associates, S18600

Prepared for Virginia Hwy. Safety Div. in cooperation with National Hwy. Traf. Safety Administration.

Corporate author

*Emergency services, *Debris removal, *Postcrash phase, *State government, *Local government, *Federal role, *Intergovernmental relations, *Virginia, *Rural areas, *Urban areas, *Police traffic services,

This study reviews existing procedures involved in restoring the scene of a traffic accident to its original condition, employed throughout the State of Virginia; identifies all federal, state, and private agencies which are available to assist in debris hazard control and cleanup; and recommends, within the framework of existing practices, laws and regulations to effect an improved program for removal of debris from a crash scene, including safe handling of hazardous or dangerous articles.

HS-012 628

1B. Injuries

CONCEPTS IN AUTOMOTIVE OCCUPANT CRASH PROTECTION

Michigan Univ. Hwy. Safety Res. Inst., M40800

For primary bibliographic entry see Fld. 5N.

HS-012 590

HUMAN TOLERANCE TO IMPACT

Transport and Road Res. Lab., T33900

E. Grattan

In HS-012 296

*Human body impact tolerances, *Injury tolerances, *Accident analysis, *Accident investigation, *Injuries by body area, *Injury rates, *Pedestrian injuries, *Injury causes, *Deformation analysis, *Injury prediction from vehicle damage,

Methods of obtaining human injury tolerance level data include tests with anthropometric dummies, animal tests, human volunteer tests, and tests using cadavers. Problems in using these test methods to obtain valuable and reliable data are mentioned. The Transport and Road Research Laboratory's approach is to collect injury data from accidents and to analyze this data to determine injury threshold levels. Data are gathered from medical examinations of seriously injured road accident victims. The cars involved in the accidents are examined in an attempt to correlate the damage to the vehicles particularly to the interiors with the injuries recorded on the occupant. The damage caused to the vehicle, by the casualty is reproduced under controlled laboratory conditions in order to determine the load needed to produce this damage and the loads acting on the occupants during the impact. Correlation of the loads with the degree of occupant injury or absence or injury for a large number of cases allows the human injury tolerance level to be estimated.

HS-012 616

COMPULSORY WEARING OF SEAT BELTS. A PRELIMINARY EVALUATION OF EFFECTS

Australia Dept. of Motor Transport, A76000

For primary bibliographic entry see Fld. 5N.

Group 1B—Injuries

HS-012 631

1C. Investigation And Records**VEHICULAR SUICIDES**

V2 N2

A. D. Pokorny J. P. Smith J. R. Finch

Contract FH-11-6603 FH-11-6798

See serial citation

*Suicide by vehicle, *Accident investigation, *Accident analysis, *Multidisciplinary teams, *Accident causes, *Driver personality, *Driver behavior, *Psychological factors, *Medical factors, *Sociological factors, *Accident case reports, *Alcoholism, *Depression, *Impulsiveness, *Driver intoxication, *Driver records, *Drinking drivers,

Twenty-eight consecutive auto crash fatalities were investigated intensively, including studies of personality, social factors, evidence concerning emotional state just prior to the crash, autopsy findings, complete body x rays, engineering and automotive inspections, and reviews by traffic specialists. It was determined that four of these 28 fatalities were suicides. In these cases, investigations revealed a pattern of alcoholism, depression, impulsiveness, and acute emotional upheavals in the drivers. It is concluded that suicide constitutes a discernible portion of fatal automobile accidents.

HS-012 586

MANDATING THE USE OF AUTOMOTIVE SAFETY BELTS IN NEW YORK STATE. RESEARCH REPORT

New York State Dept. of Motor Vehicles, N51000

For primary bibliographic entry see Fld. 5N.

HS-012 629

THE EFFECTS OF COMPULSORY SEAT BELT WEARING LEGISLATION IN VICTORIA

Victoria Road safety and Traf. Authority (Australia), V09550

For primary bibliographic entry see Fld. 5N.

HS-012 632

CAR SEAT BELT LAWS SAVE LIVES IN AUSTRALIA

News and Information Bureau (Australia), N57010

For primary bibliographic entry see Fld. 5N.

HS-012 633

ESCAPE WORTHINESS OF VEHICLES FOR OCCUPANCY SURVIVALS AND CRASHES. PT. 2.: APPENDICES. FINAL REPORT

Oklahoma Univ., O11350

For primary bibliographic entry see Fld. 5D.

HS-012 737

2. HIGHWAY SAFETY**HIGHWAY SAFETY: ANATOMY OF A PROBLEM. NORTH CAROLINA SYMPOSIUM ON HIGHWAY SAFETY, CHAPEL HILL, N. C., FALL 1969, VOL. 1**

North Carolina Univ. Hwy. Safety Res. Center, N66000

ED., P. F. Waller

Includes HS-012 589--HS-012 591.

Corporate author

*Highway safety, *Occupant protection, *Accident risk forecasting, *Highway research, *Driver vehicle road interfaces, *Driver personality, *Restraint systems, *Automobile, *Interior design,

The problems of highway safety have been assailed from three major directions, namely, the driver, the vehicle, and the road. Each approach merges with the others; yet each emphasizes different disciplines and different kinds of research. This symposium illustrates major efforts undertaken from each of the three major vantage points. Accident-producing behavior, occupant protection systems, and highway improvements are discussed.

HS-012 588

TRAFFIC SAFETY AND THE STRUCTURE OF A SOCIAL PROBLEM

Denver Univ., D10800

M. Blumenthal

Includes discussion by E. R. Oettinger.

In HS-012 592

*Highway safety, *Sociological factors, *Systems analysis, *Driver performance, *Highway design, *Value analysis, *Driver vehicle road interfaces, *Psychological factors, *Traffic management, *Police law enforcement responsibilities, *Federal role, *Driver improvement, *Highway improvements,

Traffic safety is viewed as a social problem with crashes, deaths, and injuries as symptoms of a faulty man machine system. Underlying the faulty transportation system is an ineffective management and legal system. The traffic safety problem will remain unchanged due to insufficient knowledge and the fact that more value is placed on short-range profits than on human life. Society places more emphasis on driver improvement than on improvement of highway safety. The balanced approach to traffic safety, which encompasses education, enforcement, and engineering treats the driver, the vehicle, and the highway as separate and unrelated. Systems approaches require a management interested in and capable of rational decision making with control over major components of the system and with a rational basis for predicting those influences over which they have no control.

HS-012 593

HIGHWAY SAFETY MYTHS

Bureau of Public Roads, B33600

D. Solomon

Includes discussion by B. J. Campbell.

In HS-012 592

*Highway safety programs, *Safety program effectiveness, *Program evaluation, *Highway research, *Safety research, *Accident prevention, *Accident rates, *Benefit cost analysis, *Accident risk forecasting, *Driver behavior, *Automobile power, *Drinking drivers, *Blood alcohol levels, *Driver education, *Injury rates, *Fatality rates, *Freeway planning, *Highway design, *Safety device effectiveness, *Law enforcement effect on accident rates, *Vehicle inspection, *Driver licensing, *Vehicle registration, *Traffic signal effectiveness, *Vehicle design, *High speed caused accidents, *Low speed caused accidents, *Restraint system usage, *Highway construction, *Urban highways, *Rural highways, *Traffic flow, *Systems analysis,

May 31, 1973

HIGHWAY SAFETY—Field 2

Design And Construction —Group 2D

An unbalanced highway safety program is needed giving priority to research and development; construction of more urban and rural freeways; attention to engineering aspects of the vehicle, highway, and control system; and evaluation of such unproven activities as driver education, enforcement, and driver licensing. The research and development program should include fundamental research on the driving process and traffic flow; development of new traffic systems; structural redesign of vehicles, occupant restraint systems, and roadside structures in concert; special attention to future high speed operation; and thorough test and evaluation procedures for proposed and existing techniques, systems, and devices. Slogans and myths have pervaded the highway safety field for decades. These myths have hindered good safety programs from being implemented and have aided in retaining unproven and ineffective programs. The benefit cost ratio of highway safety programs is discussed. HS-012 594

THE HIGHWAY CONTRIBUTION TO ACCIDENT GENERATION

Cornell Aeronautical Lab., Inc., C67200
K. J. Tharp
Includes discussion by W. G. Mullen.
In HS-012 592

*Highway accident potential, *Driver vehicle road interfaces, *Environmental factors, *Systems analysis, *Road conditions, *Accident factors, *Driver performance, *Accident causes, *Accident prevention, *Accident rates, *Highway design, *Traffic volume, *Perceptual analysis, *Driver errors, *Failure caused accidents, *Pavement skid resistance, *Skid resistance tests, *Pavement surface texture, *Hazards, *Benefit cost analysis, *Driving task analysis, *Highway maintenance, *Automobile defects,

The highway transportation system is composed of four components: driver; vehicle; highway—or static environment; and ambience—or dynamic environment. Illustrations of highway conditions associated with high rates of failure in the system and suggestions for combatting these failures are presented. Those involved in the design, operation, and maintenance of the physical facilities of the highway transportation system need a knowledge of the system components and the interactions of these components. Of these components, knowledge of the driver, his task, and his response to stimuli are the most essential. In addition the highway or traffic engineer must achieve a balance between economic, esthetic, and social costs and the safety aspects of the facility. Research in pavement skid resistance is discussed. HS-012 595

2C. Debris Hazard Control And Cleanup

TRAFFIC CRASH CONTROL AND CLEANUP. VOL. 1. TRAFFIC CRASH PROCEDURES

Smith (Wilbur) and Associates, S18600
For primary bibliographic entry see Fld. 1A.
HS-012 626

TRAFFIC CRASH CONTROL AND CLEANUP. VOL. 2. ADMINISTRATIVE GUIDE FOR POST TRAFFIC CRASH/INCIDENT PROCEDURES

Smith (Wilbur) and Associates
For primary bibliographic entry see Fld. 1A.
HS-012 627

DEBRIS, HAZARD CONTROL AND CLEANUP. VOL. 3. A REVIEW AND EVALUATION OF CURRENT PRACTICES RELATED TO DEBRIS HAZARD CONTROL AND CLEANUP

Smith (Wilbur) and Associates, S18600
For primary bibliographic entry see Fld. 1A.
HS-012 628

2D. Design And Construction

BIKEWAY PLANNING CRITERIA AND GUIDELINES. FINAL REPORT. A STUDY OF BICYCLE PATHWAY EFFECTIVENESS

California Univ. Inst. of Transp. and Traf. Engineering, C17000
G. FisherS. HulbertM. R. RameyS. FassD. GonzalesUCLA-ENG-7224
Contract ST-CAL-DIV-HWYS-1394
Prepared for California Dept. of Public Works.
Corporate author

*Bikeway planning, *Bikeways, *Bicycle lanes, *Bicycle safety, *Road grades, *Drainage, *Traffic capacity, *Road surfaces, *Costs, *Lane usage, *Traffic allocation, *Intersections, *Highway signs, *Street lighting, *Land usage, *Community support, *Questionnaires, *Bicycle usage, *Bikeway design, *Accident prevention, *Traffic control devices, *Hazards,

Design criteria, specifications and guidelines for providing Class 1 and Class 2 bikeway facilities are presented. Class 1 bikeways are completely separated rights-of-way designated for the exclusive use of bicycles, and Class 2 bikeways are defined as restricted rights-of-way designated for the exclusive or semi-exclusive use of bicycles. Topics treated include: bikeway design characteristics, capacity, volume criteria for separated bikeways, accident and safety considerations, alternatives for incorporating bikeways on existing streets, traffic intersections, signing, and bikeway lighting. In addition to design information, topics relating to the more global aspects of providing bikeways and routes in a community are presented. These include: short and long range planning considerations; community participation in the planning process; assessing land use impacts; mixed mode travel; bicycle parking facilities; theft prevention; techniques for assessing demand; and the design of a special bicycle-user questionnaire. HS-012 584

REDIRECTIVE EFFECTIVENESS OF BARRIER CURBS

V3 N2
D. F. Dunlap
See serial citation

*Curbs, *Barrier design, *Mathematical analysis, *Rebound, *Impact velocity, *Impact angle,

Research has shown that barrier-curb redirection performance can be described in terms of a limiting characteristic velocity which is the component of vehicle velocity normal to the curb face. The use of this performance measure and distributions of vehicle speed and the angle at which the vehicle left the road permit the development of a measure for barrier-curb redirection effectiveness. Through the application of this measure it is shown that in urban traffic conditions, an efficiently designed barrier curb can be expected to successfully redirect 70% of the vehicles accidentally leaving the roadway. HS-012 587

SAFETY--THE BY-PRODUCT OF EFFICIENCY

Texas A and M Univ. Texas Transp. Inst., T18000
C. J. Keese
Includes discussion by C. L. Heimbach, M. R. Sproles
In HS-012 588

*Highway research, *Highway improvements, *Driver vehicle road interfaces, *Highway design, *Ramp control, *Roadside hazards, *Breakaway structures, *Traffic control devices, *Impact attenuators,

The Texas Transportation Institute's approach to solving highway safety problems is discussed. The Institute's highway safety research efforts are based on the thesis that improved efficiency will result in improved highway safety. Brief discussions of some of the research undertaken by the Institute including vehicle road stability studies, freeway merging control aids, and breakaway structures are presented.
HS-012 589

SAFETY CONSIDERATIONS IN DEVELOPMENT OF DUAL-MODE TRANSPORTATION SYSTEMS

Cornell Aeronautical Lab., Inc., C67200
For primary bibliographic entry see Fld. 4H.
HS-012 601

2G. Meteorological Conditions

TRUCK TIRE NOISE

Society of Automotive Engineers, Inc., S21600
SAE-SP-373
Includes HS-012 637--HS-012 643
SAE

*Tire noise, *Truck tires, *Acoustic measurement, *Sound intensity,

The Society of Automotive Engineers' Truck Tire Noise Subcommittee was created to develop a standard testing procedure for measuring tire noise. The SAE recommended practice on sound levels of truck tires which was developed, is presented. The other reports in this publication cover much of the experimental detail that developed in the course of the Subcommittee's work and also describe the rationale behind the proposed testing procedure.
HS-012 636

ESTABLISHING A TESTING STANDARD FOR TRUCK TIRE SOUNDS

Uniroyal Tire Co., U02600
S. A. LippmannSAE-720923
In HS-012 636

*Tire noise, *Truck noise, *Acoustic measurement, *Tire tests,

As highway development programs brought increased truck traffic through formerly isolated communities, public sensitivity to truck tire noise increased significantly. Industry was alert to the possible consequences of social and legal pressures and acted in concert to set up standards for noise control and for establishing criteria by which to measure annoyance levels. Work by several leading associations provided a starting point for investigations by the SAE Truck Tire Noise Subcommittee. This paper reviews the objectives and approaches of the Sub-

committee. The Subcommittee's efforts resulted in formulation of a tire testing procedure and a consolidation of requirements to be incorporated into a proposed standard.
HS-012 637

MECHANISMS OF TIRE SOUND GENERATION

Goodrich (B. F.) Tire Co., G24000
T. R. WikR. F. MillerSAE-720924
In HS-012 636

*Tire noise, *Tire vibration, *Sound intensity, *Acoustic measurement, *Tire tread patterns, *Tire casings, *Tire deflection, *Tire pavement interface, *Spectral analysis, *Doppler effect, *Aerodynamics,

A conceptual framework has been developed for investigating the generation of sound by tires. Recent measurements have quantified some of the characteristics of truck tire sounds. The characteristics that have been measured include the peak A-weighted sound level and its dependence on the tread pattern, speed, and deflection of the tire; the effect of the road surface on tire sound levels; and the spectral distribution of tire sounds. These characteristics are discussed in terms of the mechanisms of tire sound generation.
HS-012 638

EFFECTS OF OPERATING PARAMETERS ON TRUCK TIRE SOUNDS

General Tire and Rubber Co., G12900
For primary bibliographic entry see Fld. 5V.
HS-012 639

CHARACTERISTICS OF TRUCK TIRE SOUND

Firestone Tire and Rubber Co., F12600
G. R. ThurmanSAE-720926
In HS-012 636

*Tire noise, *Truck tires, *Tire tread patterns, *Sound intensity, *Acoustic measurement, *Spectral analysis,

The nature of the sound produced by running truck tires is primarily due to the tread pattern design. At 50 mph the sounds consist of a fundamental in the frequency range 300-400 Hz and of several higher harmonics. Each of these harmonics, including the fundamental, may consist of several separate frequencies; however, the spread of these frequencies is less than one-third octave. The singing, persistent sound produced by certain tire designs is shown to be associated with the level of the higher harmonics, particularly the third and fourth.
HS-012 640

SOUND LEVELS OF HIGHWAY TRUCK TIRES, PROPOSED SAE RECOMMENDED PRACTICE XJ57

Society of Automotive Engineers, Inc., S21600
G. M. DoughertySAE-720927
In HS-012 636

*Tire noise, *Truck tires, *Acoustic measurement, *Sound intensity, *Noise standards, *Test equipment, *Test facilities, *Tire wear, *Vehicle noise, *Spectral analysis,

The final draft of the test procedure that the SAE Subcommittee on Truck Tire Noise has proposed as a recommendation is

presented. Explanation of the Subcommittee's decisions for the recommended specification are included. The recommendation is based on over five years of testing and over three years of combined efforts expended by truck manufacturers, tire manufacturers, and other participating groups. The test is primarily a tire qualification standard, since the effects of the truck and other sound sources must be minimized so that the tire sounds can be measured. The specified measurement is dBA slow response so that correlation and consistency can be obtained. Spectral analysis of the tire sound is recommended as a tool for defining problem areas, elaborating on tire design differences, and separating tire sound from vehicle sound, especially for ranked tire sounds.

HS-012 641

AN EXPERIMENT FOR RELATING OBJECTIVE AND SUBJECTIVE ASSESSMENTS OF TRUCK TIRE NOISE

General Motors Corp., G06600

For primary bibliographic entry see Fld. 5V.

HS-012 642

JURY REACTIONS TO TRUCK TIRE NOISE--AN SAE STUDY

Uniroyal Tire Co., U02600

For primary bibliographic entry see Fld. 4G.

HS-012 643

2I. Traffic Control

SAFETY--THE BY-PRODUCT OF EFFICIENCY

Texas A and M Univ. Texas Transp. Inst., T18000

For primary bibliographic entry see Fld. 2D.

HS-012 589

2J. Traffic Courts

A REPORT OF THE STATUS AND POTENTIAL IMPLICATIONS OF DECRIMINALIZATION OF MOVING TRAFFIC VIOLATIONS. FINAL REPORT

Young (Arthur) and Co., Y04800

Contract DOT-HS-123-1-179

Report for Jul 1971 - Nov 1972.

NTIS

*Traffic law violations, *Penalties, *Traffic courts, *State laws, *New York (State), *Minnesota, *California, *Traffic laws, *Court decisions, *Surveys, *Legal factors,

A nationwide survey of the extent to which non-criminal provisions exist in or are being considered by the states and the legal and philosophical bases for their use was conducted and was followed by an on-site study of the conditions in New York, Minnesota, and California which have, to varying degrees, established non-criminal categories for traffic offenses. A study was also made in selected courts to determine the potential implications of decriminalization on existing traffic court adjudication procedures and sanctions. The constitutionality of revising existing processes and sanctions was also evaluated.

HS-800 796

3. HUMAN FACTORS

TRAFFIC SAFETY AND THE STRUCTURE OF A SOCIAL PROBLEM

Denver Univ., D10800

For primary bibliographic entry see Fld. 2.

HS-012 593

RESEARCH IN AUTOMOTIVE HUMAN ENGINEERING

Ford Motor Co., F18600

J. Versace

Includes discussion by S. M. Soliday.

In HS-012 600

*Human factors engineering, *Driver vehicle interface, *Vision, *Signal visibility, *Signal lamps, *Visual perception, *Loading (operator), *Reaction time, *Driver performance, *Headlamp glare, *Anthropometry, *Eye location, *Laboratory tests, *Automobile dimensions, *Automobile interior design, *Ergosphere, *Biomechanics, *Research methods,

Three specific areas of human factors research, vision, anthropometrics, and biomechanics are described. For the automotive human engineer vision research is, to a large extent, concerned with lighting systems. Anthropometry also is concerned with vision, for in vehicle design one must determine where the driver's eyes are located to make sure that his line of vision is not obstructed. Anthropometry also deals with the interior dimensions, so that controls are placed within the reach of the operator. Biomechanics deals with the occupants' susceptibility to injury. Research methods in these areas and the problems in generalizing from the laboratory to the real world are discussed.

HS-012 603

3A. Alcohol

ALCOHOL AND HIGHWAY SAFETY. NORTH CAROLINA SYMPOSIUM ON HIGHWAY SAFETY, CHAPEL HILL, N. C., FALL, 1970, VOL. 3

North Carolina Univ. Hwy. Safety Res. Center, N66000

ED., P. F. Waller

Includes HS-012 597--HS-012 599.

Corporate author

*Drinking drivers, *Social drinking, *Driver intoxication, *Alcohol usage, *Blood alcohol levels, *Problem drivers, *Alcohol usage deterrents, *Accident factors, *Accident risks, *Alcoholism,

Of all the factors involved in highway safety, alcohol stands out as the single most important element in fatal crashes. Recent evidence suggests that the drinking driver who is involved in a fatal crash is qualitatively different from the average driver who at times combines driving with drinking. The drinking driver in fatal crashes is usually not the social drinker, but the problem drinker who has blood alcohol levels far higher than most drivers could tolerate and still attempt to drive. Drivers in alcohol involved crashes do not represent a random sample of drinking drivers, much less the entire population of drivers. The need to analyze highway crashes and create refined classifica-

Group 3A—Alcohol

tions that permit the development of appropriate countermeasures is stressed. The education of the public, including the opportunity to associate their own drinking experiences with the corresponding blood alcohol levels attained is recommended. In this way the general public would be better able to recognize the need for countermeasures to deal with the heavy drinker.
HS-012 596

MYTHS, RITUAL AND TRAFFIC SAFETY

Michigan Univ. Medical Center, M41950
M. L. Selzer
In HS-012 596

*Accident factors, *Stress (Psychology), *Drinking drivers, *Alcohol laws, *Alcoholism, *Driver behavior, *Law enforcement effect on accident rates, *Driver rehabilitation, *Alcohol usage deterrents,

Three major factors contributing significantly to highway accidents are identified. The first factor is the automotive industry and its resistance to improving vehicle safety. Myths employed by the industry which for many decades prevented or delayed meaningful changes in vehicle safety are discussed. Another major accident factor is psychological stress and its effect on driver behavior. A study that compared drivers involved in fatal accidents with a control group of drivers is described. It was found that a much greater proportion of those involved in fatal accidents had been experiencing serious stress. Alcohol is the third factor contributing to serious accidents. How society has dealt with the drinking driver is explored. The enforcement approach has led to legislation promoting the use of objective measures of the blood alcohol levels, and such measures have facilitated convictions. It is felt that trying to help the drinking drivers with their problems is a more appropriate solution than trying to increase arrest and conviction rates.
HS-012 597

THE PUBLIC AND OFFICIAL PERCEPTION OF THE LAWS DEALING WITH THE ALCOHOLICALLY IMPAIRED DRIVER

Indiana Univ., I22200
R. F. Borkenstein
Includes discussion by L. P. Watts, Jr.
In HS-012 598

*Drinking drivers, *Alcohol laws, *Blood alcohol levels, *Traffic law enforcement, *Drinking driver evidence, *Driver intoxication, *Alcohol usage, *Public opinion,

The public perception of the laws dealing with the alcohol-impaired driver has resulted in misunderstanding and consequent failure to deal with the problem. The only criterion on which impairment can be based is the blood alcohol number, since this is independent of the intake and metabolic variables. It is felt that it is necessary to educate the public to understand what a blood alcohol level of .10% means, so that jurors will be able to recognize how seriously deviant the drunk driver really is. A classification system which distinguishes between the drinking drivers who do and do not get into difficulty, is essential for the development of effective countermeasures.
HS-012 598

THE SPECTRUM OF DRINKING DRIVERS

Vermont Univ., V04200
M. W. Perrine
Includes discussion by J. C. Cornoni.
In HS-012 596

*Drinking drivers, *Problem drivers, *Accident risks, *Multiple discriminate analysis, *Accident factors, *Probability theory, *Blood alcohol levels, *Driver intoxication, *Alcohol effects, *Alcohol usage, *Driver records, *Driver behavior, *Driver characteristics, *Accident analysis, *Surveys, *Alcoholic beverages, *Vermont, *Data acquisition,

A probabilistic approach to the drinking driver is developed and the ABETS research project in Vermont is described. Extensive data from a range of drivers, including those who had been convicted of driving while intoxicated and those who had died in automobile crashes were collected. Findings from a small selection of variables which are presumed to be most relevant for depicting the spectrum of drinking drivers, namely, alcohol variables (including distribution of blood alcohol concentration, reported alcohol consumption, the alcohol consumption index, frequency of driving after drinking, and the relation of crash risk and blood alcohol concentration) and driving history variables (including previous crashes, citations, and license suspensions), as well as the results of a discriminant analysis based upon some of these are presented. In general the data very clearly demonstrate the unequivocal differences between drivers who are involved in fatal crashes, drivers who are convicted of drunk driving, and at-risk drivers on the same roads where serious crashes occur.
HS-012 599

ALCOHOL COUNTERMEASURES. A STATUS REPORT

V73 N2
C. F. Livingston
See serial citation

*Alcohol usage deterrents, *Alcohol breath tests, *Alcohol laws, *Alcohol Safety Action Projects, *Safety program effectiveness, *Blood alcohol levels, *Driver intoxication, *Alcohol education, *Safety campaigns, *Mass media, *Advertising, *Drinking drivers, *Accident prevention, *Alcohol prevention, *Alcohol blood tests, *Alcohol chemical tests, *Federal role, *Community support,

Accomplishments of the 1972 NHTSA Alcohol Countermeasures Program are outlined. A portable breath testing unit for measuring blood alcohol concentration of drivers at the roadside will be field tested by 10 police departments. All states now have implied consent laws, nine states have enacted prearrest screening laws, and five states have passed laws making it illegal to operate a vehicle with a blood alcohol concentration of .10% or more. Alcohol safety curricula, workshops, mass media, and celebrity tours have contributed to public education. Program emphasis is on Alcohol Safety Action Projects. Data from eight ASAP's show an apparent reduction of highway deaths in ASAP areas. Top priorities are the documentation, simulation, consolidation, and dissemination of findings from the ASAP countermeasure activities, and the support of local and state applications of alcohol countermeasures in non-ASAP areas.
HS-012 623

B. Anthropomorphic Data**RESEARCH IN AUTOMOTIVE HUMAN ENGINEERING**

ord Motor Co., F18600
or primary bibliographic entry see Fld. 3.
S-012 603

RESEARCH IN AUTOMOTIVE HUMAN ENGINEERING

ord Motor Co., F18600
or primary bibliographic entry see Fld. 3.
S-012 603

DEVELOPMENT AND IMPROVEMENT OF IMPACT TEST METHODS

Motor Industry Res. Assoc. (England), M60600
or primary bibliographic entry see Fld. 5D.
S-012 617

THE USE OF MODELS IN AUTOMOBILE IMPACT RESEARCH

Chrysler U. K. Ltd. (England), C42800
or primary bibliographic entry see Fld. 4G.
S-012 622

IMPACT RESPONSE OF THE HUMAN THORAX

General Motors Corp., G06600 University Hosp., San Diego, Calif. U10300
J. E. Lobdell C. K. Kroell D. C. Schneider W. E. Hering A. M. Rahum GMR-1292
Presented at General Motors Res. Symposium, 2-3 Oct 1972.
Corporate author

Chest impact tolerances, *Impact tests, *Cadavers in testing, Mathematical models, *Biomechanics, *Muscular forces, Deflection, *Dummies, *Anthropomorphic dummy design, Test equipment, *Loading (mechanical), *Test volunteers, Impact velocity, *Injury prediction, *Human body mass, Equations of motion, *Impact caused skeletal damage, *Human body simulation, *Human body segment parameters,

Thoracic impact response data for unembalmed human cadavers were averaged, adjusted to reflect a muscle tensing estimate, and used as the basis for recommended force-deflection corridors to serve as dummy design guidelines. A volunteer study of muscle tensing, as related to thoracic stiffness at low force and deflection levels and additional recent response data are discussed. Second order refinements for future generations of a high fidelity dummy thorax are considered. Chest structures of five dummies were evaluated for blunt impact force-deflection response. Testing was conducted in essentially the same manner used to acquire the cadaver data. Resulting force-deflection characteristics were compared with recommended performance corridors. Existing structures developed excessive resisting forces at deflection levels beyond 3/4 inch, clearly indicating the need for an improved design. A mathematical model was used for dummy thorax design and to show the relationship between types of blunt thoracic impact.
S-012 635

3C. Cyclists**BIKEWAY PLANNING CRITERIA AND GUIDELINES. FINAL REPORT. A STUDY OF BICYCLE PATHWAY EFFECTIVENESS**

California Univ. Inst. of Transp. and Traf. Engineering, C17000
For primary bibliographic entry see Fld. 2D.
HS-012 584

3D. Driver Behavior**DIE REGELTÄTIGKEIT DES AUTOFAHRERS BEI KURSABWEICHUNGEN (THE CONTROL ACTIVITY OF THE DRIVER AT COURSE DEVIATIONS)**

M. Mitschke K. Niemann
Text in German.
See serial citation

*Driver performance, *Vehicle control, *Driver vehicle interface, *Vehicle handling, *Driver emergency responses, *Driver reaction time, *Steering, *Computerized simulation, *Driver modeling, *Crosswind, *Equations,

Twenty-nine test volunteers participated in driving experiments which consisted of keeping on course three vehicles which deviated from the normal driving track because of pulling brakes. All variables which could serve as information for the driver, his reaction, and the turning cycle of the steering wheel were measured. The measured information was supplied to a computer model of the driver and varied until a good agreement with the measured turning cycle of the steering wheel was obtained. The equation describing driver behavior was derived from the computer model. A sufficient precision was given by a linear differential equation with constant coefficients. The variations of the constants comprised in this equation were examined for the individual drivers. Medial values, were formed by which a theoretical investigation of the whole driver-vehicle system with respect to stability as well as to the course deviation at disturbance by sinusoidal side-wind could be done.
HS-012 585

VEHICULAR SUICIDES

For primary bibliographic entry see Fld. 1C.
HS-012 586

HIGHWAY SAFETY: ANATOMY OF A PROBLEM. NORTH CAROLINA SYMPOSIUM ON HIGHWAY SAFETY, CHAPEL HILL, N. C., FALL 1969, VOL. 1

North Carolina Univ. Hwy. Safety Res. Center, N66000
For primary bibliographic entry see Fld. 2.
HS-012 588

THE UNDERSTANDING AND PREDICTION OF ACCIDENT-PRODUCING BEHAVIOR

California Univ., Irvine, C15300
F. L. McGuire
Includes discussion by W. G. Dahlstrom.
In HS-012 588

*Accident risk forecasting, *Driver personality, *Driver behavior, *Low risk drivers, *High risk drivers, *Driver characteristics, *Driver age, *Driver sex, *Male drivers,

*Female drivers, *Age factor in accidents, *Sex factor in accidents, *Socioeconomic data, *Racial factors, *Psychological factors, *Driver records, *Driver mileage, *Accident proneness,

From 1962-64 nearly 7,738 license applicants in Jackson, Mississippi, were administered a biographical questionnaire and the McGuire Safe Driver Scale. After two years each subject was interviewed, and his subsequent driving record obtained. Complete data were obtained on 2,797 subjects. Analyses and interpretation of the data revealed that biographical variables, primarily age and sex, contribute more to accurate prediction of driver record than any of the other variables studied. While personality factors do not add to the predictive efficiency, they do provide clues as to the characteristics of the safe driver. The safe driver appears to be older, more conservative, less adventurous, and more narrow in his adherence to social norms, and to come from a lower socio-economic background. The accident producer is identified as being younger, coming mostly from an upper socio-economic family background, being more adventurous, ambitious, and less tied to social convention.
HS-012 591

MYTHS, RITUAL AND TRAFFIC SAFETY

Michigan Univ. Medical Center, M41950
For primary bibliographic entry see Fld. 3A.
HS-012 597

VISUAL ACQUISITION OF INFORMATION IN DRIVING THROUGH EYE-MOVEMENT TECHNIQUES: AN OVERVIEW

Ohio State Univ., O05400
For primary bibliographic entry see Fld. 3L.
HS-012 602

THE YOUNG DRIVER: RECKLESS OR UNPREPARED? NORTH CAROLINA SYMPOSIUM ON HIGHWAY SAFETY, CHAPEL HILL, N. C., FALL 1971, VOL. 5

North Carolina Univ. Hwy. Safety Res. Center, N66000
ED., P. F. Waller
Includes HS-012 605--HS-012 607.
Corporate author

*Adolescent drivers, *Young adult drivers, *Age factor in driving, *Age factor in accidents, *Driver experience, *Risk taking, *Driver behavior, *Driver characteristics, *Problem drivers, *Accident risk forecasting, *Accident rates, *Driver records, *Driver attitudes, *High risk drivers, *Driver skills, *Male drivers, *Driver performance, *Sex factor in accidents,

Adolescent driving as deviant behavior, youthful drivers (aged 15-24) as a special safety problem, and the young (under 30) problem driver are discussed to determine why the death rate on the highway reaches its peak for males aged 15-24. The experience, characteristics, attitudes, behavior, and records of young drivers are studied. Improvement of young driver performance is discussed from the aspects of driver training, influencing attitudes, and channeling risk taking behavior in less hazardous directions.
HS-012 604

ADOLESCENT DRIVING AS DEVIANT BEHAVIOR

Michigan State Univ., M33000
D. Klein
Includes discussion by P. B. Fiddleman.
In HS-012 604

*Adolescent drivers, *Driver behavior, *Age factor in driving, *Driver characteristics, *Driver attitudes, *Driver performance, *Psychological factors, *Driver behavior research, *High risk drivers, *Automobile cultural role, *Adolescent conduct codes, *Driver social class, *Driver experience, *Automobile ownership, *Alcohol usage, *Drug usage,

The adolescent deviates from adult norms because he is isolated from adult society and deprived of adult rights and privileges. Rehabilitative measures have largely attempted to make the adolescent driver more like the adult driver. By definition, adolescents constitute a deviant group; hence they would have to deviate from their own group in order to conform to the adult model. Deviant performance may be characteristic of young people's driving because they are in the initial stages of learning the driving task. The more autonomy and satisfaction a young person can achieve in other ways, the less he will use the automobile to meet his status needs. More immediate improvements in highway safety will be achieved by making vehicle and highway changes to increase accident survivability than from attempting to change adolescent driving behavior. Reasons underlying adolescent drug use are discussed.
HS-012 605

YOUTHFUL DRIVERS AS A SPECIAL SAFETY PROBLEM

National Transp. Safety Board, N30000
L. G. Goldstein
Includes discussion by D. J. Moffie.
In HS-012 604

*Adolescent drivers, *Young adult drivers, *Age factor in accidents, *Accident rates, *Driver mileage, *Driver characteristics, *Driver experience, *Regression analysis, *Traffic law violations, *Driver records, *Convictions, *Drinking drivers, *Blood alcohol levels, *Drug usage, *Motorcycle operator fatalities, *Smoking, *Fatality rates, *Day of week, *Time of accidents, *Single vehicle accidents, *Ran off road accidents, *Sex factor in accidents, *Driving effect on scholarship, *High risk drivers, *Low risk drivers, *Driver education, *Time series analysis, *Design of experiments, *Correlation analysis, *Mathematical models,

Experience is perhaps a greater determiner of accident involvement than age. Drivers aged 15-24 are overrepresented in motorcycle and in single car, run off the road accidents. Students who use a car most have the poorest grades. Young drivers with poor records exhibit greater hostility, aggressiveness, impulsive tendencies, and lack of social responsibility. For young males crashes and violations are associated with impulsive expression, rebellion, and hostility. Smoking is related to driver record, and alcohol is a factor in a large proportion of accidents involving young drivers. The extent to which other drugs are implicated is difficult to determine. Three programs through which increased effort can improve young driver performance are driver preparation, licensing, and improvement. Young drivers will benefit most from progress made in vehicle crashworthiness and highway design. The use of theory, hypotheses, correlational designs, time series analysis, experimental designs, and threats to validity in highway safety research are discussed.

HS-012 606

THE YOUNG PROBLEM DRIVER

Iowa Univ., I48600

D. H. Schuster

Includes discussion by W. L. Walker.

In HS-012 640

*Young adult drivers, *Adolescent drivers, *Problem drivers, *Adult drivers, *Age factor in driving, *High risk drivers, *Driver characteristics, *Driver attitudes, *Driver records, *Maturity, *Sociological Factors, *Psychological factors, *Drinking drivers, *Driver skills, *Driver performance, *Driver improvement, *Driving simulators, *Mass media, *California, *Iowa, *Legal factors,

Characteristics, attitudes, and records of problem drivers under 30, older problem drivers, and average drivers in California and Iowa are compared. Problem drivers drive more, but they also show differences in personality and maturity. Young problem drivers differ from young average drivers in sociability and accident and violation attitudes. Studies concerning successful driver improvement techniques and the role of psychosocial factors, alcohol, visual perceptual skills, and distraction and stress in problem driving are reviewed. The following techniques appear to be effective in improving young problem driver behavior: perceptual training to spot accident hazards, driver improvement interviews, personalized warning letters, showing and discussing local driver errors on television, giving lenient action officially but expecting improvement, and making official action and driving restrictions contingent upon immediate past driving performance. Highway safety is discussed as a legal problem.

HS-012 607

HOW AGING AFFECTS THE DRIVER

V73 N2

T. W. Planek R. B. Overend

See serial citation

*Aged drivers, *Age factor in driving, *Aging, *Driver performance, *Driver physical fitness, *Driver behavior, *Vision age changes, *Visual degradation, *Age factor in accidents, *Hearing, *Psychophysical discrimination, *Perception, *Decision making, *Driver reaction time, *Medical factor caused accidents, *Driver licensing,

The deficits of aging fall into two overlapping categories; the behavioral deficits due to the aging process, in and of itself, and the various aspects of medical disability that interact with the neurological and physiological changes. Studies of the behavioral deficits of aging dealing with sensory reception, neural processing and transmission, and motor response, and studies dealing with frequency of medical factor caused accidents are briefly reviewed. Based on the evidence available, it is concluded that instead of restricting all aged drivers to specific roadways, during specific hours, under limited traffic conditions, efforts should be made to adjust the system of traffic signing and signaling to provide cues that are more useful for aging drivers. Evidence indicates that aging drivers adapt to today's traffic better than might be expected.

HS-012 624

COUNTERMEASURES FOR YOUNG DRIVERS.**FINAL REPORT**

Michigan Univ., M36600

For primary bibliographic entry see Fld. 3E.

HS-800 765

**A CORRELATIONAL STUDY BETWEEN SELF
CONCEPT AND DRIVER PERFORMANCE IN POST
DRIVER EDUCATION MALE AND FEMALE
STUDENTS IN SELECTED SOUTHERN ILLINOIS
HIGH SCHOOLS (USING A HIGHWAY SYSTEMS
RESEARCH CAR)**

Southern Illinois Univ., S31200

T. Spurlock SOILU-SFTY-72-10-HSR

Prepared for Office of Superintendent of Public Instruction,
Safety Education Section, Springfield, Ill.
NTIS

*High school drivers, *Driver performance, *Driver attitudes, *Correlation analysis, *Male drivers, *Female drivers, *Illinois, *Driver education evaluation, *Highway Systems Research Car, *Steering reversals, *Speed changes, *Psychological factors, *Braking, *Reviews, *Driver behavior, *Driver psychological tests, *Data analysis, *Driver task analysis, *Driver monitoring, *Driver personality, *Age factor in driving, *Driver behavior research, *Sex factor in driving, *Road tests,

The Highway Systems Research (HSR) Car and the Tennessee Self Concept Scale (TSCS) were utilized to measure driver performance and self concept of 29 male and 21 female students. The driver performance test route was 16.5 miles of four lane limited access highway, two lane sixteen foot roadway, and residential streets. Tests were completed on dry pavement between 8:00 a.m. and 3:30 p.m. with similar wind conditions. Male correlates failed to provide significance on any of the TSCS and HSR Car Driver Performance test items, while four female correlates were determined significant at the .01 level of confidence for four compared scores: self satisfaction and personal self scores of the TSCS when correlated with accelerator reversals; behavior scores when correlated with speed changes; and personal self when correlated with fine steering reversals.

HS-840 020

**A MULTIVARIATE STUDY OF OBJECTIVELY
MEASURED DRIVER PERFORMANCE FACTORS OF
HIGH SCHOOL STUDENTS (USING A HIGHWAY
SYSTEMS RESEARCH CAR)**

Southern Illinois Univ., S31200

L. B. Lindauer SOILU-SFTY-72-09-HSR

Sponsored by National Hwy. Traf. Safety Administration.
Prepared for Office of Superintendent of Public Instruction,
Safety Education Section, Springfield, Ill.
NTIS

*Driver performance, *Driver evaluation devices, *Driving task analysis, *Driver monitoring, *Instrumented vehicles, *Factor analysis, *Highway Systems Research Car, *High school drivers, *Drivometers, *Speed changes, *Vehicle control, *Driver experience, *Driver sex, *Steering reversals, *Braking, *Time factors, *Linear regression analysis, *Driver mileage, *Illinois, *Reviews, *Multivariate analysis,

The purposes of this study were to develop an objective index of the efficiency of high school driver performance and to gain knowledge of the driving task as performed by 85 novice drivers, measured by the Highway Systems Research instrumentation. The data obtained were analyzed through factor

Field 3—HUMAN FACTORS

HSL 73, No. 10

Group 3D—Driver Behavior

analytic and multiple regression treatments. Two factor vectors were selected to serve as criteria for linear regression models. Demographic variables including driver experience, the high school at which instruction was received, driver sex, the driver education instructor, student's experience with trucks, motorcycles, or tractors; and the interaction between driver sex and driver mileage were not effective in predicting the Control Input Rate Factor scores when used in a linear combination. Driver sex effectively predicted the Vehicle Speed Factor score independently of the linear combination. The factor scores for each of the subjects provided a ready means of identification for individual evaluation purposes.

HS-840 021

THE OBJECTIVE MEASUREMENTS OF DRIVER PERFORMANCE ON STUDENT DRIVER EDUCATION TEACHERS (USING A HIGHWAY SYSTEMS RESEARCH CAR)

Southern Illinois Univ., S31200

N. J. Greenfield/SOILU-SFTY-72-11-HSR

Prepared for Office of Superintendent of Public Instruction, drive. By use of a T test it was determined that student driver education teachers did not significantly improve in reduction of the number of fine steering reversals, coarse steering reversals, speed changes, accelerator reversals, or brake applications per minute, when compared to basic driver education students. On certain driver performance actions each group did show significant improvement. actions each group did show significant improvement.

NTIS

*Driver performance, *Instructors, *Driver education, *College students, *Driver education evaluation, *Correlation analysis, *Highway Systems Research Car, *Instructor certification, *Drivometers, *Driver monitoring, *Driver experience, *T test, *Steering reversals, *Speed changes, *Braking, *Tracking, *Driving task analysis, *Road tests, *Data analysis, *Illinois, *Questionnaires, *Reviews,

The Highway Systems Research Car was used to give a matched sample of 19 pairs of students at Southern Illinois University a pre-test and post-test over a selected 16.5 mile test route consisting of three types of roadway. The control group consisted of 19 students enrolled in a basic driver education course. The experimental group of 19 students enrolled in a driving instructor preparation course, had experience in teaching beginning students to drive. By use of a T test it was determined that student driver education teachers did not significantly improve in reduction of the number of fine steering reversals, coarse steering reversals, speed changes, accelerator reversals, or brake applications per minute, when compared to basic driver education students. On certain driver performance actions each group did show significant improvement.

HS-840 022

HIGHWAY SYSTEMS RESEACH CAR STUDIES AND RELATED LITERATURE. ANNOTATED BIBLIOGRAPHY

Southern Illinois Univ., S31200

SOILU-SFTY-72-12-HSR

Sponsored by National Hwy. Traf. Safety Administration. Prepared for Office of Superintendent of Public Instruction, Safety Education Section, Springfield, Ill.

NTIS

*Instrumented vehicles, *Bibliographies, *Driving task analysis, *Drivometers, *Driver evaluation devices, *Driver performance, *Driver monitoring, *Biomedical monitoring, *Driver tests, *Driver skills, *Highway Systems Research Car, *Data analysis, *Driver education, *Driving simulation, *Traffic flow,

An annotated listing of reports, articles, and papers which mention or utilize the Drivometer, Highway Systems Research Instrumentation, or similar devices is presented arranged in alphabetical order by author. A common theme of all of the studies included is the objective measurement of driver performance through the use of instrumented vehicles.

HS-840 023

3E. Driver Education

COUNTERMEASURES FOR YOUNG DRIVERS. FINAL REPORT

Michigan Univ., M36600

D. C. Pelz/S. H. Schuman

Contract DOT-HS-031-1-035

NTIS

*Driver improvement, *High school drivers, *Adolescent drivers, *Young adult drivers, *Male drivers, *Female drivers, *Driver records, *Accident rates, *Traffic law violations, *Driver age, *Driver behavior, *Program evaluation, *T test, *Data analysis, *Accident severity, *Drinking drivers, *High school driving courses, *Driver educational level,

In an effort to reduce the outbreak of highway crashes and citations observed among young males aged 18-19, countermeasure programs were conducted with seniors in ten suburban high schools including driving workshops one day a week for six weeks. Records of 9,000 subjects including control drivers from paired school districts were followed over 18 months after treatment. Although average driving behavior did not change, young men were not indifferent to the workshops. Their accident rate rose during the first 12 months but dropped in months 13-18, particularly among those who had poor grades and were older than classmates, whose crash rate dropped to one-fourth the pre-treatment level. Men with good grades had stable records, and women showed neutral or adverse long-term responses. A program of police sponsored assemblies had no visible effect on subsequent driving. These trends suggest further trials of workshops, aimed at aleinated males in the junior rather than senior year, including individualized experiences.

HS-800 765

THE OBJECTIVE MEASUREMENTS OF DRIVER PERFORMANCE ON STUDENT DRIVER EDUCATION TEACHERS (USING A HIGHWAY SYSTEMS RESEARCH CAR)

Southern Illinois Univ., S31200

For primary bibliographic entry see Fld. 3D.

HS-840 022

3F. Driver Licensing

COUNTERMEASURES FOR YOUNG DRIVERS. FINAL REPORT

Michigan Univ., M36600

For primary bibliographic entry see Fld. 3E.

HS-800 765

3G. Drugs Other Than Alcohol

DRUG ABUSE AND DRIVING PERFORMANCE. FINAL REPORT. VOL. 1.

Dunlap and Associates, Inc., D31800
R. D. BlombergD. F. Preusser
Contract DOT-HS-099-1-184
Report for 30 Jun 1971 - 31 Oct 1972.
NTIS

*Drug effects, *Driver performance, *Driver records, *Driver mileage, *Accident rates, *New York (State), *Drug addiction, *Heroin, *Traffic law violations, *Driver behavior, *Methadone, *Drug usage, *Questionnaires, *Interviews, *Driver characteristics, *Data processing, *Data analysis,

Data on 1,562 methadone maintenance patients in New York State were gathered through interviews. A control group of 1,059 people was constructed by asking the experimentals to volunteer names of non-addicted friends. Data from the interviews were analyzed to develop a description of the driving habits and exposure of the drug abusers during four periods in their lives, pre-drug, non-heroin, heroin, and methadone. The major finding was that the experimental group drove at or above the national mileage average during all four time periods. Mileage estimates during the heroin period were particularly high, averaging over 18,000 miles per year. It was also found that drug abusers who drive are likely to drive immediately after using drugs. State driver records for 718 experimentals and 579 controls were obtained and analyzed. In general, the accident and violation rates for the experimental group were no worse than those for the controls for all years covered by the driver records.

HS-012 754

3L. Vision

MUSHROOMING TECHNOLOGY: NEW DIRECTIONS IN HIGHWAY SAFETY. NORTH CAROLINA SYMPOSIUM ON HIGHWAY SAFETY, RALEIGH, N. C., SPRING 1971, VOL. 4

North Carolina Hwy. Safety Res. Center, N66000
For primary bibliographic entry see Fld. 4H.
HS-012 600

VISUAL ACQUISITION OF INFORMATION IN DRIVING THROUGH EYE-MOVEMENT TECHNIQUES: AN OVERVIEW

Ohio State Univ., O05400
T. H. Rockwell
Includes discussion by S. R. Schroeder.
In HS-012 600

*Visual behavior, *Eye movements, *Perceptual analysis, *Driving task analysis, *Visual perception, *Driver performance, *Data analysis, *Photographic equipment, *Search performance, *Alcohol effect on vision, *Visual degradation, *Central vision, *Peripheral vision,

Eye movement research conducted at Ohio State University is discussed and techniques for measuring eye movements are described. The eye movement techniques developed have been used to study how driver performance varies as a function of both intra-subject and environmental variables, such as ex-

perience, fatigue, alcohol, illumination, and traffic load. These research techniques can also be used to evaluate the effectiveness of different kinds of highway signing and highway design. Eye movement research has shown that there are important differences between experienced and novice drivers' eye movements. Skilled drivers concentrate more on the focus of expansion, making greater use of peripheral vision. The behavior of the experienced driver could be used as a standard against which other drivers could be measured. This procedure would be useful in driver training as well as driver licensing. Laboratory research on oculomotor systems is briefly reviewed.
HS-012 602

RESEARCH IN AUTOMOTIVE HUMAN ENGINEERING

Ford Motor Co., F18600
For primary bibliographic entry see Fld. 3.
HS-012 603

4. OTHER SAFETY-RELATED AREAS

4A. Codes And Laws

A REPORT OF THE STATUS AND POTENTIAL IMPLICATIONS OF DECRIMINALIZATION OF MOVING TRAFFIC VIOLATIONS. FINAL REPORT

Young (Arthur) and Co., Y04800
For primary bibliographic entry see Fld. 2J.
HS-800 796

4B. Community Support

ALCOHOL COUNTERMEASURES. A STATUS REPORT

For primary bibliographic entry see Fld. 3A.
HS-012 623

A COMPREHENSIVE SEARCH FOR COST- EFFECTIVENESS DATA FOR HIGHWAY SAFETY COUNTERMEASURES. FINAL REPORT

Center for the Environment and Man, Inc., C34500
H. C. Joks4137-478
Contract DOT-HS-246-2-492
Report for 20 Jul - 20 Dec 1972.
NTIS

*Highway safety programs, *Benefit cost analysis, *Safety program effectiveness, *Accident prevention, *Injury prevention, *Fatality prevention, *Driver education, *Driver licensing, *Driver improvement, *Headgear laws, *Seat belt usage laws, *Traffic laws, *Traffic law enforcement, *Vehicle inspection, *Defective vehicles, *Recall campaigns, *Headlamp regulations, *Pedestrian safety, *Emergency medical services, *Public information programs, *Bibliographies,

Cost-effectiveness data is summarized for driver education, licensing, and improvement; safety equipment use laws; traffic laws and their enforcement; vehicle inspection; defective vehicle recall campaigns headlight regulation; pedestrian safety; public information; and post-crash phase operations. Synopses of relevant studies and a bibliography are included.
HS-800 803

Group 4B—Community Support

4C. Cost Effectiveness

HIGHWAY SAFETY MYTHS

Bureau of Public Roads, B33600
For primary bibliographic entry see Fld. 2.
HS-012 594

THE HIGHWAY CONTRIBUTION TO ACCIDENT GENERATION

Cornell Aeronautical Lab., Inc., C67200
For primary bibliographic entry see Fld. 2.
HS-012 595

PRODUCT SAFETY: AN ECONOMIC VIEW

For primary bibliographic entry see Fld. 5Q.
HS-012 608

A COMPREHENSIVE SEARCH FOR COST-EFFECTIVENESS DATA FOR HIGHWAY SAFETY COUNTERMEASURES. FINAL REPORT

Center for the Environment and Man, Inc., C34500
For primary bibliographic entry see Fld. 4B.
HS-800 803

4D. Governmental Aspects

AN APPROACH TO SAFER VEHICLES

England Dept. of the Environment, E08100
P. N. Gerosa
In HS-012 296

*Government industry cooperation, *Regulations, *Vehicle safety standards, *Great Britain, *Federal role,

The British government's role in vehicle safety and its approach to vehicle regulation are briefly discussed.
HS-012 609

4G. Mathematical Sciences

DIE REGELTÄTIGKEIT DES AUTOFAHRERS BEI KURSABWEICHUNGEN (THE CONTROL ACTIVITY OF THE DRIVER AT COURSE DEVIATIONS)

For primary bibliographic entry see Fld. 3D.
HS-012 585

REDIRECTIVE EFFECTIVENESS OF BARRIER CURBS

For primary bibliographic entry see Fld. 2D.
HS-012 587

THE SPECTRUM OF DRINKING DRIVERS

Vermont Univ., V04200
For primary bibliographic entry see Fld. 3A.
HS-012 599

YOUTHFUL DRIVERS AS A SPECIAL SAFETY PROBLEM

National Transp. Safety Board, N30000
For primary bibliographic entry see Fld. 3D.
HS-012 606

VEHICLE FRONTAL BARRIER IMPACTS

British Leyland Motor Corp. Ltd., B25730
For primary bibliographic entry see Fld. 5D.
HS-012 620

THE USE OF MODELS IN AUTOMOBILE IMPACT RESEARCH

Chrysler U. K. Ltd. (England), C42800
J. A. B. Wolfe
In HS-012 296

*Mathematical models, *Occupant modeling, *Automobile modeling, *Equations of motion, *Model tests, *Impact tests, *Degrees of freedom, *Human body simulation, *Occupant kinematics, *Anthropometric dummies, *Anthropomorphic dummies, *Deceleration, *Acceleration response, *Seat belt loading, *Test equipment, *Acceleration onset rate, *Injury severity index, *Time factors, *Femurs, *Crush tests, *Neck motion range, *Displacement, *Impact velocity, *Head acceleration tolerances,

Two dimensional models, a 5 degrees of freedom vehicle model and a 4 degrees of freedom occupant model have been developed and some of the limitations and benefits assessed. Provision was made in the occupant model for belt loads to be displacement and velocity dependent. Vehicle models primarily allowed load distribution and the effect of alterations to structure and configuration on vehicle crush characteristics to be studied. Combined occupant and vehicle models could eventually be used to predict the behavior of radical designs. A case study of an occupant response to a given vehicle deceleration signature is presented. Modeling techniques are outlined and equations of motion are included.
HS-012 622

A PRACTICAL APPROACH TO THE SELECTION AND SIZING OF BRAKES TO MEET FMVSS-121

Wagner Electric Corp., W00800
For primary bibliographic entry see Fld. 5A.
HS-012 634

IMPACT RESPONSE OF THE HUMAN THORAX

General Motors Corp., G06600 University Hosp., San Diego, Calif. U10300
For primary bibliographic entry see Fld. 3B.
HS-012 635

TRUCK TIRE NOISE

Society of Automotive Engineers, Inc., S21600
For primary bibliographic entry see Fld. 2G.
HS-012 636

AN EXPERIMENT FOR RELATING OBJECTIVE AND SUBJECTIVE ASSESSMENTS OF TRUCK TIRE NOISE

General Motors Corp., G06600
For primary bibliographic entry see Fld. 5V.
HS-012 642

JURY REACTIONS TO TRUCK TIRE NOISE--AN SAE STUDY

Uniroyal Tire Co., U02600
S. A. Lippmann SAE-720929

In HS-012 636

*Tire tires, *Truck noise, *Acoustic measurement, *Sound intensity, *Auditory perception, *Judgement, *Spectral analysis,

A jury of 23 members located at the side of the road repeatedly scored their responses to the sounds of trucks as they passed by. The trucks operated under a variety of conditions. The A-weighted sound level accounts for the bulk (but not all) of the jury's reaction to the sound of trucks coasting on a variety of tires. A component of the jury's reaction is related by the study to the manner in which the sound decays after the vehicle passes the point of observation. This component also appears to depend strongly on the characteristics of the sound. The jury's reaction shows two forms of distortion: end-of-scale compression and temporal drift. The analysis attempts to account for these factors and to see beyond them into the jury's basis for reacting.

HS-012 643

ESCAPE WORTHINESS OF VEHICLES FOR OCCUPANCY SURVIVALS AND CRASHES. PT. 2.: APPENDICES. FINAL REPORT

Oklahoma Univ., O11350

For primary bibliographic entry see Fld. 5D.

HS-012 737

SIDE IMPACT CRASHWORTHINESS OF FULL-SIZE HARDTOP AUTOMOBILES. FINAL REPORT, PHASE 2

Dynamic Science, D36000

For primary bibliographic entry see Fld. 5D.

HS-800 757

BASIC RESEARCH IN CRASHWORTHINESS 2--LARGE DEFLECTION DYNAMIC ANALYSIS OF PLANE ELASTO-PLASTIC FRAME STRUCTURES INCLUDING THE CASES OF COLLISION INTO A POLE OR FLAT BARRIER. INTERIM TECHNICAL REPORT

Calspan Corp., C23600

For primary bibliographic entry see Fld. 5D.

HS-800 781

A STUDY OF THE AERODYNAMIC EFFECTS AND STABILITY CHARACTERISTICS OF BUSES. VOL. 1. SUMMARY REPORT

Bendix Res. Labs., B10200

For primary bibliographic entry see Fld. 5B.

HS-800 797

A STUDY OF THE AERODYNAMIC EFFECTS AND STABILITY CHARACTERISTICS OF BUSES. VOL. 2. FINAL TECHNICAL REPORT

Bendix Res. Labs., B10200

For primary bibliographic entry see Fld. 5B.

HS-800 798

PHYSICS AND AUTOMOBILE SAFETY BELTS. SUPPLEMENTARY CURRICULUM MATERIAL

American Institutes for Res., A33150

For primary bibliographic entry see Fld. 5N.

HS-800 817

4H. Transportation Systems

MUSHROOMING TECHNOLOGY: NEW DIRECTIONS IN HIGHWAY SAFETY. NORTH CAROLINA SYMPOSIUM ON HIGHWAY SAFETY, RALEIGH, N. C., SPRING 1971, VOL. 4

North Carolina Hwy. Safety Res. Center, N66000

ED., P. F. Waller

Includes HS-012 601--HS-012 603.

Corporate author

*Safety research, *Driver vehicle interface, *Automatic highways, *Driving task analysis, *Visual behavior, *Eye movements, *Human factors engineering, *Urbmobiles, *Technology, *Research methods, *Dual mode transportation systems,

Papers presented deal with the contributions of technology to highway safety. As the driving task becomes more complex and the need grows to move more vehicles at higher rates of speed, the most sophisticated technology possible must be applied: first, to analyze the driving task so that the necessary skills can be taught and appropriate vehicles can be designed, and, second, to provide, wherever feasible, automated systems of transportation. Advances in eye movement research, aimed at analyzing the acquisition of information during the driving task, and human factors engineering research, are discussed. A dual mode transportation system that would automate much of the driver's task but which could be developed in conjunction with many of our more familiar transportation systems is described.

HS-012 600

SAFETY CONSIDERATIONS IN DEVELOPMENT OF DUAL-MODE TRANSPORTATION SYSTEMS

Cornell Aeronautical Lab., Inc., C67200

R. A. Wolf

Includes discussion by J. W. Horn.

In HS-012 600

*Urbmobiles, *Guideway systems, *Automatic highways, *Electric vehicles, *Guidance systems, *Vehicle guidance, *Automatic headway control, *Federal role, *Systems analysis, *Crashworthiness, *Vehicle performance, *Vehicle control, *Distance headways, *Automatic control, *Research methods, *Transportation planning, *Dual mode transportation systems,

The case for a dual mode transportation system is presented. Such a system would combine many of the advantages of the private automobile with the advantages of automatically controlled, high-speed, high-density transportation. The vehicles used could operate under their own power on regular streets but could also lock into a guideway system where speed and headways are automatically controlled. The history of the dual mode concept is traced and components of a dual mode system (urbmobile, guideways, and terminals) are described. Possible street mode problems of the system would be in the areas of vehicle performance and crashworthiness. Anticipated problems areas of the guided mode include on-line longitudinal control, lateral control, merge control and in-station operation. Some solutions to these problems are presented. The necessity of federal leadership in developing a dual mode system is emphasized.

HS-012 601

Field 5—VEHICLE SAFETY

Group 4H—Transportation Systems

5. VEHICLE SAFETY

AN ANALYSIS OF THE MAJOR DEFICIENCIES OF THE FEDERAL MOTOR VEHICLE SAFETY STANDARDS

Public Interest Res. Group, P40100
C. Nash
Author

*Vehicle safety standards, *Federal role, *Rule making, *Safety programs, *Vehicle design, *Compliance tests, *Accident prevention, *Crashworthiness, *Safety standards compliance, *Safety program effectiveness, *Consumer protection,

Deficiencies of the Federal Motor Vehicle Safety Standards (FMVSS) are unenforceable provisions due to poorly defined standards and lack of coverage. The FMVSS have not been as successful as they might have been in reducing death and injury on our roads. Although fatality rates per vehicle-mile have decreased significantly since 1966, this resulted in only a slight decrease in total vehicle fatalities in 1970. To upgrade the FMVSS, NHTSA published a program plan in October of 1971 which sets out a timetable through 1976 for new and revised safety standards concentrating on crashworthiness and operating systems. If gaps in the program are overcome and there is no slippage between planning and actual rule making, this plan can eliminate many of the present deficiencies of the FMVSS. Precrash, crash, postcrash, and new vehicle safety standards are analyzed individually. The proposed, issued, and effective dates of rule making promised in the program plan on existing standards and new rule making are tabulated.
HS-012 625

5A. Brake Systems

TOWARDS SAFER BRAKING

Engineering and Group Devel. (England), E07750
S. M. Parker
In HS-012 296

*Brake systems, *Braking optimization, *Brake performance, *Performance characteristics, *Antilocking devices, *Stopping distance,

Performance requirements of an ideal braking system include consistent performance, regardless of usage; unimpaired performance with any system failure; shortest possible stopping distance on all surfaces; and normal steering control under maximum braking. The extent to which these requirements can be met and are being provided is discussed. Consistent performance has been greatly improved by the adoption of disc brakes with their greater thermal capacity and elimination of self servo effects. A system which duplicates front brake operation is available and is in limited use. Brake proportioner systems and anti-wheel locking devices are being developed which will improve stopping distance performance; and methods of improving steering control under braking are being studied.
HS-012 612

ANTI-LOCKING BRAKE SYSTEMS: A COMPARISON BETWEEN 2-WHEEL AND 4-WHEEL CONTROL

Girling Ltd., G18300
B. Ingram
In HS-012 296

*Antilocking devices, *Antiskid brakes, *Wheel locking, *Four wheel brakes, *Wheel locking friction, *Surface friction, *Vehicle handling, *Vehicle stability, *Vehicle control, *Rear wheel drives, *Front wheel drives, *Skidding, *Braking forces, *Brake laws, *Selflocking differentials,

Vehicle behavior is dependent on the time interval between locking of the front and rear wheels. If the rear wheels lock before the front wheels, this may be sufficient to slew the vehicle round. In a rear wheel antilocking system, if the vehicle is completely unstable, then to apply the brakes hard will help restore stability. On surfaces with a rising friction characteristic (such as loose gravel or light snow), rear wheel antilocking systems can achieve the very best stopping distances while the front wheels are allowed to plough into the surface to create higher adhesion. Locked front wheels result in a loss of directional control. If all four wheels lock, directional control may be lost completely. Four wheel control enables the driver to brake and steer in an emergency. Four wheel antilocking systems can achieve considerable reductions in stopping distance. The importance of safety system legislation is emphasized.
HS-012 613

ANTI-LOCK BRAKE DEVELOPMENT

Jaguar Cars Ltd. (England), J00400
R. J. Knight
In HS-012 296

*Antilocking devices, *Brake system design, *Braking optimization, *Antiskid brakes, *Wheel locking, *Brake performance, *Economic factors,

Recent trends, as well as the history of antilock brake systems are outlined. The activities of British Leyland Motor Corp. in this area are discussed.
HS-012 614

A PRACTICAL APPROACH TO THE SELECTION AND SIZING OF BRAKES TO MEET FMVSS-121

Wagner Electric Corp., W00800
R. C. Bueler, E. J. Falk, SAE-730198
Presented at International Automotive Engineering Conference, Detroit, 8-12 Jan 1973.
SAE

*Brake standards, *Air brakes, *Truck brakes, *Vehicle dynamics, *Brake tests, *Dynamic tests, *Dynamometers, *Federal laws, *Vehicle stability, *Vehicle control, *Stopping distance, *Brake performance, *Stopping time, *Deceleration, *Brake torque, *Wheelbases, *Brake system design, *Vehicle weight, *Axle loads, *Tire road contact forces, *Wheel locking, *Skidding, *Mathematical analysis,

A rational, practical method has been developed to size and select brakes which will meet the requirements of FMVSS-121 for a wide variety of truck models and sizes, with a minimum

May 31, 1973

VEHICLE SAFETY—Field 5

Design—Group 5D

number of brakes. The technique utilizes Newtonian mechanics to categorize vehicle sizes and allow selection of common brake packages for each category. Actual sizing and selection was based on dynamometer test data.
HS-012 634

5B. Buses, School Buses, And Multipurpose Passenger Vehicles

A STUDY OF THE AERODYNAMIC EFFECTS AND STABILITY CHARACTERISTICS OF BUSES. VOL. 1. SUMMARY REPORT

Bendix Res. Labs., B10200
R. E. Wong M. Seitzman S. Chiang C. C. Matle 6451-Summ
Contract DOT-HS-090-2-291
Report for 8 Feb 1972-8 Dec 1972.
NTIS

For abstract and search terms see HS-800 798.
HS-800 797

A STUDY OF THE AERODYNAMIC EFFECTS AND STABILITY CHARACTERISTICS OF BUSES. VOL. 2. FINAL TECHNICAL REPORT

Bendix Res. Labs., B10200
R. E. Wong M. Seitzman S. Chiang C. C. Matle 6451
Contract DOT-HS-090-2-291
Report for 8 Feb 1972 - 8 Dec 1972.
NTIS

*Bus stability, *Aerodynamics, *Computerized simulation, *Mathematical models, *Passing, *Vehicle dynamics, *Crosswind, *Vehicle control, *Vehicle width, *Turning, *Braking, *Lane changing, *Side friction (traffic flow), *Vehicle size, *Travel trailers, *Towing, *Parameters, *Wet road conditions, *Driver modeling, *Wind velocity, *Automobile models, *Digital computers, *Hybrid computers, *Lateral force, *Wakes, *Inertial forces, *Equations of motion, *Moments of inertia, *Speed, *Bus tests,

Computerized simulation was used to predict and compare standard (96) and wide (102) bus stability and effects on stability, control, and path deviation caused by aerodynamic disturbances generated when buses and trucks pass small or intermediate size passenger cars and cars towing trailers. In predicting bus stability four maneuvers were considered: turning, turning with braking, lane change or avoidance maneuver, and lane change with braking on a horizontal road surface. The wide bus provided better stability than the standard bus. There are no appreciable differences in path deviations during passenger vehicle and bus or truck encounters in the absence of crosswinds. There are differences in path deviation as crosswinds increase from 0 to 40 mph. When buses or trucks pass small or intermediate cars in crosswinds these vehicles are drawn toward the passing vehicle. Passing vehicles cause intermediate cars towing trailers to move away from the passing vehicles.
HS-800 798

5C. Cycles

BIKEWAY PLANNING CRITERIA AND GUIDELINES. FINAL REPORT. A STUDY OF BICYCLE PATHWAY EFFECTIVENESS

California Univ. Inst. of Transp. and Traf. Engineering, C17000
For primary bibliographic entry see Fld. 2D.
HS-012 584

5D. Design

CONCEPTS IN AUTOMOTIVE OCCUPANT CRASH PROTECTION

Michigan Univ. Hwy. Safety Res. Inst., M40800
For primary bibliographic entry see Fld. 5N.
HS-012 590

MUSHROOMING TECHNOLOGY: NEW DIRECTIONS IN HIGHWAY SAFETY. NORTH CAROLINA SYMPOSIUM ON HIGHWAY SAFETY, RALEIGH, N. C., SPRING 1971, VOL. 4

North Carolina Hwy. Safety Res. Center, N66000
For primary bibliographic entry see Fld. 4H.
HS-012 600

MUSHROOMING TECHNOLOGY: NEW DIRECTIONS IN HIGHWAY SAFETY. NORTH CAROLINA SYMPOSIUM ON HIGHWAY SAFETY, RALEIGH, N. C., SPRING 1971, VOL. 4

North Carolina Hwy. Safety Res. Center, N66000
For primary bibliographic entry see Fld. 4H.
HS-012 600

SAFETY CONSIDERATIONS IN DEVELOPMENT OF DUAL-MODE TRANSPORTATION SYSTEMS

Cornell Aeronautical Lab., Inc., C67200
For primary bibliographic entry see Fld. 4H.
HS-012 601

VEHICLE INSTRUMENTATION AND ROAD SAFETY

Smith Industries Ltd. (England), S18700
W. W. Bischoff
In HS-012 296

*Instrumentation, *Human factors engineering, *Instrument panel visibility, *Headup displays, *Instrument panel design, *Speedometers, *Braking recorders, *Oil level indicators, *Tachometers, *Audio warning devices, *Peripheral vision, *Field of view, *Colored lights, *Gauges, *Visual aids, *Control location, *Driver vehicle familiarity, *Commercial vehicles, *Accident statistics, *Accident investigation, *Vehicle handling,

The speedometer; brake, engine, and oil gauges; and the tachometer must be grouped together and positioned as close to the driver's normal line of vision as road visibility considerations will permit. Focusing on the speedometer and then looking back to the road and refocusing takes an average of 1.5 seconds. To solve this problem a speed image was projected onto the windshield of a Rover 2000 car and focused sufficiently far ahead for the driver to see while looking at the road. The headup display should also include a warning light linked

Field 5—VEHICLE SAFETY

HSL 73, No. 10

Group 5D—Design

only to services whose failure constitutes a safety hazard and a safe following distance indicator. The layout of the information display should follow an accepted standard to avoid confusion when drivers change vehicles.

HS-012 615

DEVELOPMENT AND IMPROVEMENT OF IMPACT TEST METHODS

Motor Industry Res. Assoc. (England), M60600

M. A. Macaulay

In HS-012 296

*Impact tests, *Dummies, *Energy absorbing steering columns, *Impact forces, *Automobile design, *Load bearing capacity, *Head on impact tests, *Barrier collision tests, *Impact caused injuries,

Impact test rates and reliability have been increased, but problems still exist. Shortcomings of dummies used include lack of repeatability, over-complicated setting up, lack of durability, and inaccurate representation of human behavior. The aim of the test program is to develop a test procedure which will reproduce only the essential features of a real life situation to give a simple, repeatable test which would guarantee satisfactory performance in service.

HS-012 617

VEHICLE FRONTAL BARRIER IMACTS

British Leyland Motor Corp. Ltd., B25730

P. M. Finch

In HS-012 296

*Barrier collision tests, *Head on impact tests, *Impact velocity, *Impact forces, *Energy absorbing front structures, *Structural analysis, *Crush tests, *Vehicle design, *Deformation analysis, *Impact sleds, *High speed impact tests, *Energy absorption, *Mathematical models, *Kinetic energy, *Crash phase, *Loading (mechanical), *Dummies,

Results of 30 mph frontal barrier impact tests using impact sleds and dummies show that in a barrier crash sequence the forces on the structure are maximized at the front of the vehicle because the mass being decelerated increases from the rear to the front. A front end structure which is too stiff will result in high passenger compartment decelerations; while one which is too flexible may result in excessive steering column penetration and mechanical intrusion into the passenger compartment. For high speed impacts it is better to absorb energy due to engine mass at the commencement of impact by placing it as far forward in the engine compartment as possible. Longitudinal members and load bearing panels must produce a progressive collapse sequence, from front to rear to dissipate the maximum amount of energy prior to deformation and intrusion of the occupant compartment.

HS-012 620

OCCUPANT PROTECTION IN SIDE IMPACTS

Ford Motor Co. Ltd., F20400

M. Rodger

In HS-012 296

*Occupant protection, *Side impact collisions, *Padding, *Structural design, *Crashworthy bodies, *Side impact tests,

*Vehicle vehicle impact tests, *Static compression tests, *Stiffness, *Pole impact tests, *Barrier collision tests, *Impact velocity, *Vehicle vehicle interface, *Vehicle size,

Occupant protection in side impacts is dependent on both the form of restraint employed and the vehicle structural strength. In side impacts seat belts cannot offer enough lateral restraint to head and torso, and current air bag systems are too slow, both in sensing the impact and inflating the bag. The most effective type of restraint is a form of energy absorbing padding, which, has the disadvantage of permanently taking up space inside the car. Strengthening the vehicle side, is advantageous, but in those cases where the vehicle slides bodily into a fixed object, the increased side strength brings no benefit, and can in some instances be harmful by increasing the decelerations of the undeformed parts of the vehicle. The relative merits of increased side strength, and increased interior padding, depend upon the size and weight of the car. Test results suggest that side strength is more critical for the large car, while interior padding is critical for the small car. Test procedures used to study vehicle side impact response are reviewed and evaluated.

HS-012 621

THE USE OF MODELS IN AUTOMOBILE IMPACT RESEARCH

Chrysler U. K. Ltd. (England), C42800

For primary bibliographic entry see Fld. 4G.

HS-012 622

THE USE OF MODELS IN AUTOMOBILE IMPACT RESEARCH

Chrysler U. K. Ltd. (England), C42800

For primary bibliographic entry see Fld. 4G.

HS-012 622

ESCAPE WORTHINESS OF VEHICLES FOR OCCUPANCY SURVIVALS AND CRASHES. PT. 2.: APPENDICES. FINAL REPORT

Oklahoma Univ., O11350

C. M. Slipevich W. D. Steen J. L. Purswell R. F. Krenek J. R. Welker

Contract FH-11-7512

Continues the studies initiated under FH-11-7303, the final report for which is available from NTIS (PB-198 772 and PB-198 773). Report for 1 Jun 1970—31 Jul 1972.

NTIS

*Escape from vehicle, *Bibliographies, *Accident case reports, *Mathematical analysis, *Flammability, *Flammability tests, *Combustion rate, *Vehicle fires, *Submerged vehicle escape, *Accident analysis, *Accident diagrams, *Postcrash phase, *Vehicle design, *Interior design, *Accident caused fires, *Computer programs, *Vehicle flotation time, *Biomechanics, *Anthropometry, *Accident investigation, *Fire extinguishers, *Toxicity, *Fuel tank leakage, *Fatalities, *Injuries, *Occupant protection, *Occupant rescue, *Leak detectors, *Fuel composition, *Muscular forces, *Materials tests, *Handles, *Escapeworthiness, *Crashworthy bodies, *Door opening force, *Fabrics, *Precrash phase, *Crash phase,

The appendices include a selective bibliography of 799 entries and 15 accident investigation reports. Detailed analytical methods used in the escape worthiness studies of vehicle submergence and of maximum arm and hand forces available for

May 31, 1973

VEHICLE SAFETY—Field 5

Inspections—Group 51

vehicle egress are presented. Ignition and burning rate data for materials used in vehicle interiors are tabulated.

HS-012 737

SIDE IMPACT CRASHWORTHINESS OF FULL-SIZE HARDTOP AUTOMOBILES. FINAL REPORT, PHASE 2

Dynamic Science, D36000

L. M. Shaw E. Enserink 2310-72-29

Contract DOT-HS-046-1-209

Phase 1 is documented in DOT-HS-800 654. Report for Jan-Oct 1972.

NTIS

*Crashworthiness, *Side impact tests, *Energy absorbing side structures, *Automobile design, *Automobile modification, *Structural analysis, *Materials tests, *Door systems, *Padding, *Polyurethane foams, *Instrumented vehicles, *Crashworthy bodies, *Passenger compartments, *Pole impact tests, *Vehicle vehicle impact tests, *Impact velocity, *Anthropomorphic dummies, *Occupant kinematics, *Acceleration tolerances, *Accelerometers, *Lateral acceleration, *Automobile handling, *Performance tests, *Automobile stability, *Vehicle weight, *Injury prevention, *Occupant protection, *Restraint system design, *Structural design, *Frame acceleration, *Honeycomb structures, *Data reduction,

A crashworthy side structure design was developed and verified through analytical studies, energy absorbing material and door system tests, and full-scale crash testing. Two vehicle side impact tests and one pole impact test were conducted. The optimum concept and materials were identified through structural and trade-off analyses and consisted of: a stiffened occupant compartment rigidly coupled to a reinforced frame and a crushable foam energy absorbing system. Results of verification side impact tests conducted with modified vehicles containing anthropomorphic dummies and handling tests of modified vehicles are included. Modified vehicle production weight and cost estimates are given. Recommendations for future modification are presented.

HS-800 757

BASIC RESEARCH IN CRASHWORTHINESS 2-- LARGE DEFLECTION DYNAMIC ANALYSIS OF PLANE ELASTO-PLASTIC FRAME STRUCTURES INCLUDING THE CASES OF COLLISION INTO A POLE OR FLAT BARRIER. INTERIM TECHNICAL REPORT

Calspan Corp., C23600

R. Shieh YB-2987-V-7

Contract FH-11-7622

NTIS

*Crashworthiness, *Frame tests, *Dynamic structural analysis, *Structural deformation analysis, *Deflection, *Barrier collision tests, *Pole impact tests, *Mathematical analysis, *Plasticity, *Impact forces, *Computer programs, *Algorithms, *Flow charts, *Numerical analysis, *Matrix reduction, *Computer printouts, *Dynamic loads, *Frame design, *Equations, *Elasticity, *Impact angle, *Load bearing capacity, *Mathematical representations,

Using the matrix displacement method of frame analysis, the dynamic problem is formulated as a set of nonlinear initial value problems. Each problem governs the dynamic response in a time interval within which an analytical solution exists. The end point of each time interval is determined by initiation of a new plastic loading or unloading condition at some beam member end cross-section (s). An exact solution procedure based on modifying the member stiffness matrix is outlined. A computational algorithm for an approximate formulation using the Runge-Kutta numerical integration technique together with the associated computer program is developed. The analysis is applied to a moveable frame structure colliding into a pole and symmetrically into a massive rigid flat barrier (or into another identical frame structure). The computer program is used in crashworthiness studies of automobile structures colliding into a pole or barrier. A good correlation is obtained between analytical and test results for decelerations and displacements.

HS-800 781

FABRICATION, INSTALLATION, TEST AND EVALUATION OF MOTORCYCLE CONTROLS AND DISPLAYS; GEAR POSITION INDICATOR, NON- LINEAR THROTTLE, TACTILE INDICATOR OF NEUTRAL POSITION. FINAL REPORT

Essex Corp., E19400

B. Livingston

Contract DOT-HS-120-2-317

Report for Mar-May 1972.

NTIS

*Motorcycle design, *Control location, *Display systems, *Performance tests, *Throttles, *Gear shift levers, *Human factors engineering, *Test equipment, *Touch, *Control equipment,

The design of motorcycles must reflect adequate consideration of the physical and perceptual capabilities and limitations of the operator in order to achieve the optimum in system safety and performance. Undesirable features of throttle controls and gear position indicators were identified and innovative designs which modified them were developed, installed, and tested on a Honda test motorcycle. Mechanical design changes made to the throttle control reduced the engine speed level at a given throttle control setting as compared to the standard design. Test driving of the motorcycle indicated the test-designed throttles to be discernably less sensitive than the standard design and, thus, easier to operate and control. Although the test design required a greater degree of control movement to achieve the same rate of vehicle acceleration, there was no noticeable degradation of vehicle performance once the difference in control operation was learned.

HS-800 804

5I. Inspections

INSPECTION OF MOTOR VEHICLES IN BLOOMINGTON, INDIANA AND MONROE COUNTY, VOL 1. FINAL SUMMARY REPORT

Ultrasystems, Inc., U00800

Jr., F. G. Fisher R. Eidemiller P. Biche US-81205-2

Contract DOT-HS-094-1-130

Report for Jun 1971 - Mar 1972.

NTIS

Group 5I—Inspections

This study was conducted to establish the safety status of the vehicle-induse population of Bloomington, Indiana and the surrounding Monroe County. The Mobile Inspection Facility was utilized to collect the data. The vehicle sample was drawn by randomized sampling techniques and was partitioned such that it is representative of both the national vehicle profile and the Indiana vehicle profile. All aspects of the van operations were evaluated. A computer program was designed for analysis and presentation of the data. It was concluded that the van provides an effective means of collecting large samples of data in a limited period of time; and that there is a definite need to revise the manuals and to replace certain items of equipment supplied with the van. The major problem incurred in performing the study concerned acquiring a high enough response rate from vehicle owners to meet the vehicles/day inspection capacity of the van. 13 Mobile inspection stations; Vehicle inspection; Inspection equipment; Indiana; Manuals; Vehicle sampling; Statistical analysis; Chi square test; T test; Data acquisition; Data banks; Data analysis; Vehicle age; Vehicle mileage; Failures; Design of experiments
HS-800 772

5N. Occupant Protection

HIGHWAY SAFETY: ANATOMY OF A PROBLEM. NORTH CAROLINA SYMPOSIUM ON HIGHWAY SAFETY, CHAPEL HILL, N. C., FALL 1969, VOL. 1
North Carolina Univ. Hwy. Safety Res. Center, N66000
For primary bibliographic entry see Fld. 2.
HS-012 588

HIGHWAY SAFETY: ANATOMY OF A PROBLEM. NORTH CAROLINA SYMPOSIUM ON HIGHWAY SAFETY, CHAPEL HILL, N. C., FALL 1969, VOL. 1
North Carolina Univ. Hwy. Safety Res. Center, N66000
For primary bibliographic entry see Fld. 2.
HS-012 588

CONCEPTS IN AUTOMOTIVE OCCUPANT CRASH PROTECTION

Michigan Univ. Hwy. Safety Res. Inst., M40800
R. G. Snyder
Includes discussion by: R. G. Pearson and J. H. Meredith.
In HS-012 588

*Occupant protection, *Automobile safety characteristics, *Restraint system design, *Restraint system effectiveness, *Three point restraint systems, *Air bag restraint systems, *Automobile interior design, *Occupant vehicle interface, *Safety cars, *Crash response forecasting, *Head restraint design, *Child restraint systems, *Windshield design, *Occupant kinematics, *Injury causes, *A pillars, *Steering wheel design, *Energy absorbing steering columns, *Instrument panel design, *Headers, *Side impact collisions, *Injuries, *Safety seats, *Injury prevention,

The contributions of restraint systems and vehicle interior design to crash survivability are discussed. Occupant restraint systems including seat belt systems, head restraints, child restraint systems, and air bag systems, are reviewed, and experimental restraint designs are discussed. The windshield, steering assembly, instrument panel, header, side rail, and A pillar are identified as the major structural features of the vehi-

cle which contribute to occupant injury. Progress in reducing the injury potential of these vehicle features is discussed and suggestions for further improvements are made. Methods of determining vehicle impact protection capability are also briefly discussed.

HS-012 590

SEAT BELT SYSTEMS FOR THE FUTURE

Auto Restraint Ltd. (England), A78500
E. Nicol
In HS-012 296

*Seat belt fastening warning systems, *Seat belt regulations, *Federal control, *Ignition seat belt interlocks, *Inertia reels, *Audio warning devices, *Seat belt tests, *Deceleration tests, *Automatic seat belts, *Seat belt assembly anchorages, *Three point restraint systems, *Impact tests, *Dummies, *Circuit analysis, *Manual control, *Occupant protection, *Seat belt design,

The components of audio, visual, and starter interlock seat belt warning systems developed to meet 1972 and 1973 U. S. requirements are described. Retractor reel requirements, choice of motive power, anchorage point integrity and adjustability, emergency belt release, and control circuit design for passive seat belts being developed to meet August 1975 U. S. requirements are discussed. Deceleration and impact tests using dummies are being conducted to meet seat belt injury requirements.
HS-012 618

OCCUPANT PROTECTION IN SIDE IMPACTS

Ford Motor Co. Ltd., F20400
For primary bibliographic entry see Fld. 5D.
HS-012 621

MANDATING THE USE OF AUTOMOTIVE SAFETY BELTS IN NEW YORK STATE. RESEARCH REPORT

New York State Dept. of Motor Vehicles, N51000
D. B. Negri
Corporate author

*Seat belt usage laws, *Seat belt usage, *Law enforcement, *Seat belt inspection, *Injury prevention, *New York (State), *Victoria (Australia), *Air bag restraint systems, *State laws, *Seat belt effectiveness, *Injury rates, *Fatality rates, *Fatality prevention, *Shoulder harness usage, *Three point restraint system usage, *Pregnancy, *Child safety, *Exemptions, *Seat belt tests, *Urban areas, *Rural areas, *Compliance, *Accident studies,

If everyone involved in N. Y. accidents in 1971 had worn safety belts it is estimated that 1,648 lives would have been saved and 34,178 injury cases prevented. Results from the 1970 Australian safety belt law during a nine month period are applied to the volume of accidents in New York and indicate there would have been a reduction of 187 deaths in rural areas in 1971 and 162 deaths in metropolitan areas. Enforcement of a mandatory safety belt law to produce universal compliance is unrealistic. However, a high degree of compliance is attainable. Children under age eight, and any one with a certifiable medical or psychiatric condition which counterindicates that the wearing of a safety belt should be exempt from mandatory belt use. If safety belt use is mandated, consideration should be given to requiring only the use of the lap belt.

May 31, 1973

VEHICLE SAFETY—Field 5
Occupant Protection—Group 5N

HS-012 629

COMPULSORY SEAT BELT WEARING IN AUSTRALIA

Australia Dept. of Shipping and Transport, A76100
A. P. Vulcan
Presented at 16th Stapp Car Crash Conference, Nov 1972.
Reference copy only

*Seat belt usage laws, *Seat belt effectiveness, *Seat belt usage, *Seat belt statistics, *Public opinion, *Injury rates, *Fatality rates, *Injury prevention, *Fatality prevention, *Australia, *Chi square test, *Injuries,

The development of seat belt legislation in Australia is traced. A public attitude survey and studies conducted in Victoria on the effectiveness of seat belt usage laws are reviewed. The opinion poll conducted during November-December 1971 at eight urban locations indicated that over 75% agreed with the law. Results from the other studies indicated that the Victorian legislation has substantially increased belt usage rates and significantly decreased driver and passenger fatalities and injuries. A study conducted by the Royal Australasian College of Surgeons also shows that since the Victorian legislation, the accident injury pattern has changed with fewer multiple and severe injuries occurring including a steady decline in spinal and serious eye injuries.

HS-012 630

COMPULSORY WEARING OF SEAT BELTS. A PRELIMINARY EVALUATION OF EFFECTS

Australia Dept. of Motor Transport, A76000
M. Henderson
Corporate author

*Seat belt usage laws, *Seat belt usage, *Seat belt effectiveness, *New South Wales, *Fatality rates, *Injury rates, *Accident studies, *Injury prevention, *Fatality prevention, *Accident survivability, *Side impact collisions, *Passenger compartments, *Crashworthy bodies, *Occupant protection, *Accident risk forecasting, *Breakaway structures, *Highway design, *Public opinion,

Compulsory wearing of seat belts legislation in New South Wales has been enforced since November 1, 1971. Surveys of seat belt wearing in daylight commuter traffic, during off-peak time and in shopping traffic, showed that the wearing rate of seat belts in front seat positions rose 25% before the legislation to 75% soon afterwards, equivalent to an almost 100% wearing rate for those vehicles with seat belts. A direct comparison between the number of vehicle occupants killed in the first quarter of 1971 with those killed in the first quarter of 1972 shows a reduction from 172 to 133, or 23%. Cumulative weekly totals of deaths to occupants of all vehicle types from 1970-1972 and a method for predicting fatalities are presented. Further improvements in occupant protection must be sought in increasing passenger compartment crashworthiness, improving restraints, and reducing the hazards of rigid roadside obstacles.

HS-012 631

THE EFFECTS OF COMPULSORY SEAT BELT WEARING LEGISLATION IN VICTORIA

Victoria Road safety and Traf. Authority (Australia), V09550
D. C. Andreassend

Presented at National Road Safety Symposium, Canberra, Australia, 14-16 Mar 1972.
Corporate author

*Seat belt usage, *Seat belt effectiveness, *Seat belt usage laws, *Accident studies, *Accident analysis, *Injury rates, *Fatality rates, *Fatality prevention, *Injury prevention, *Rural areas, *Urban areas, *Females, *Males, *Driver attitudes, *Driver social class, *Trip length, *Injury severity, *Victoria (Australia), *Surveys, *Three point restraint systems,

The effects of seat belt legislation were studied by a continuing observance study to determine wearing rates of drivers and left hand front passengers at time of peak accident occurrence; interviews of motorists to ascertain their frequency of use, attitudes to compulsory wearing, age, trip length, purpose, and the correctness of wearing; and determination of relative wearing rates of driver and passenger according to their respective sex. The effect on accidents was examined in terms of overall changes and detailed involvement by accident type. Interim results appear to indicate that compulsory wearing has been effective. Seat belt usage in Victoria is being observed by 64-75% of the drivers. The overall vehicle driver casualties have fallen by about 14% due to belt wearing in the first six months of 1971. The wearing rate appears to vary with the length of the trip and the socio-economic status of the driver. Detailed examination of accident data shows seat belt wearing to have casualty reduction potential in a variety of accident types.

HS-012 632

CAR SEAT BELT LAWS SAVE LIVES IN AUSTRALIA

News and Information Bureau (Australia), N57010
L. Carroll
Reference copy only

*Seat belt usage laws, *Seat belt usage, *Seat belt effectiveness, *New South Wales, *Victoria (Australia), *Injury prevention, *Fatality prevention, *Injury rates, *Fatality rates, *Accident survivability, *Injury severity, *Accident studies, *Exemptions, *Accident prevention, *Seat belt standards,

Seat belt usage became compulsory in Victoria in December 1970 and in the rest of Australia on January 1, 1972. Studies in New South Wales and Victoria have shown a marked reduction in deaths and injuries among car occupants since seat belt legislation was introduced. Comparison of the first six month of 1970 (no compulsion) with similar months of 1971 (compulsion) in Victoria showed an 18.2% reduction of injuries and fatalities among car drivers and passengers, compared to a 5.7% casualty reduction for road users not affected by seat belt regulations. Victoria's sharp decline was not paralleled in other states, where seat belt wearing remained voluntary over these two periods. A 23% reduction was shown almost immediately in New South Wales, after enforcement became the rule in October 1971. Results of a seat belt usage study are included, and national and state roles in accident prevention and safety standards development are discussed.

HS-012 633

SIDE IMPACT CRASHWORTHINESS OF FULL-SIZE HARDTOP AUTOMOBILES. FINAL REPORT, PHASE 2

Dynamic Science, D36000
For primary bibliographic entry see Fld. 5D.
HS-800 757

Group 5N—Occupant Protection

DEPLOYABLE HEAD RESTRAINTS. FINAL REPORT

Michigan Univ. Hwy. Safety Res. Inst., M40800
 J. F. Hilyard J. W. Melvin J. H. McElhaney
 Contract DOT-HS-031-2-281
 Report for 15 Jan 1972 - 1 Feb 1973. This research is a continuation of NHTSA contract FH-11-7612.
 NTIS

*Head restraints, *Head restraint design, *Restraint system tests, *Restraint system effectiveness, *Rear end impact tests, *Impact sleds, *Angle impact tests, *Seat design, *Performance characteristics, *Occupant kinematics, *Anthropometric dummies, *Head acceleration tolerances, *Rebound, *Extension, *Air bag inflation devices, *Test equipment, *Inflatable head restraints,

The object of this program was to extend and further develop the concept of the inflating head restraint system, with special emphasis on development of totally inflating systems with self-contained fore-and-aft stiffness and development of optimum head restraint shapes for oblique as well as direct rear end impacts. Head restraint system requirements were defined; proposed head restraints/inflator concepts were evaluated; and candidate systems for testing were selected. The design of an integral seat/head restraint system, for use in impact sled tests and vehicle crash tests is described and results of impact tests on the candidate systems are presented. Of three candidate systems, the HSRI/UniRoyal prototype best met the following criteria: minimization of head displacement and acceleration and relative head/torso motion; compact storage; rapid inflation, with minimum hazard to occupants; and simplicity of construction.

HS-800 802

PHYSICS AND AUTOMOBILE SAFETY BELTS. SUPPLEMENTARY CURRICULUM MATERIAL

American Institutes for Res., A33150
 P. Kortman C. E. Witt J. A. Klingensmith
 Contract FH-11-7522
 GPO \$1.50

*Safety belts, *Physics, *Curricula, *Seat belt effectiveness, *Programmed instruction, *Velocity, *Acceleration, *Torque, *Impact forces, *Occupant kinematics, *Seat belt loading, *Stress (mechanics), *Strain (mechanics), *Seat belts, *Momentum, *Laboratory tests, *Occupant kinetics,

This collection of problems and experiments related to automobile safety belt usage is intended to serve as a supplement to a standard physics course. Its purpose is to convince students that use of safety belts to prevent injury or death is supported by the considerations of physical quantities and laws which apply in a collision situation. The material is divided into sections according to major physical concepts—velocity, acceleration, momentum, force, impulse, torque, energy, and stress and strain. Each section contains short classroom demonstrations, examples and problems, a laboratory, and some programmed instructional materials.

HS-800 817

5Q. Safety Defect Control

PRODUCT SAFETY: AN ECONOMIC VIEW

V2 N3
 L. B. Lave
 See serial citation.

*Product safety, *Benefit cost analysis, *Value analysis, *Defective products, *Consumer protection, *Safety standards, *Life value, *Automobile safety characteristics, *Safety device effectiveness, *Automobile design, *Seat belts, *Dual brakes, *Federal role, *Regulation enforcement, *Injury probability, *Consumer preferences, *Energy absorbing steering columns, *Energy absorber, *Consumer education,

Consumers should have more freedom and information to choose among products with a range of safety. Regulatory agencies should avoid setting high minimum standards of safety for products. The market has generally worked quite well to incorporate the correct level of safety in products, in spite of the millions of injuries each year. Emphasis is placed on consumer education and on the proper roles of the consumer and governmental regulatory agency. A benefit cost analysis for seat belts, dual brakes, padded instrument panels, and energy absorbing steering columns first required in 1968 cars is used as an example of the proper decision process. Values consumers place on life and injury are weighted.

HS-012 608

5R. Steering Control Systems

VEHICLE HANDLING CHARACTERISTICS

Moulton Developments Ltd. (England), M65250
 A. E. Moulton
 In HS-012 296

*Vehicle handling, *Accident avoidance tests, *Steering tests, *Skid pan tests, *Vehicle stability, *Cornering, *High speed, *Roll, *Lateral acceleration, *Vehicle control, *Vehicle dynamics, *Turning radius, *Test equipment, *Vehicle design, *Test tracks, *Test drivers,

Three tests of vehicle handling characteristics which enable a driver to avoid an accident situation are described. The Chicane test involves a violent swerve to avoid an obstacle followed by a return to the original vehicle path. Speeds for different vehicles vary between 45 and 60 mph and very little difference is experienced between damp and dry conditions. Skid pad tests using a two wheeled trolley show that there is a relationship between roll angle at a given lateral acceleration and the Chicane time. Too liberal use of roll bar stiffness introduces unacceptable levels of roll rock. The Clotoide test simulates a 90 degree turn in which the bend decreases and then opens. The measured criterion is the highest speed at which the driver can enter the turn and negotiate it at constant speed without hitting a post. It is desirable for the breakaway to occur gently at the rear first, but with neutral behavior during and beyond the limit. In all vehicles large roll angles are inimical to good handling.

HS-012 610

MEASUREMENT AND ANALYSIS OF VEHICLE HANDLING

Ford Motor Co. Ltd., F20400
 D. Stratton
 In HS-012 296

*Vehicle handling, *Vehicle performance, *Performance tests, *Transducers, *Instrumented vehicles, *Electronic monitoring systems, *Data reduction, *Computerized simulation, *Vehicle dynamics,

Determination of vehicle handling performance involves relating subjective assessments of handling qualities to objective measurements; and correlating theoretical analyses with measurements. Instrumentation and data reduction techniques used in a vehicle handling measurement and analysis system are described.
HS-012 611

A STUDY OF THE AERODYNAMIC EFFECTS AND STABILITY CHARACTERISTICS OF BUSES. VOL. 1. SUMMARY REPORT
Bendix Res. Labs., B10200
For primary bibliographic entry see Fld. 5B.
HS-800 797

A STUDY OF THE AERODYNAMIC EFFECTS AND STABILITY CHARACTERISTICS OF BUSES. VOL. 2. FINAL TECHNICAL REPORT
Bendix Res. Labs., B10200
For primary bibliographic entry see Fld. 5B.
HS-800 798

5V. Wheel Systems

TRUCK TIRE NOISE
Society of Automotive Engineers, Inc., S21600
For primary bibliographic entry see Fld. 2G.
HS-012 636

ESTABLISHING A TESTING STANDARD FOR TRUCK TIRE SOUNDS
Uniroyal Tire Co., U02600
For primary bibliographic entry see Fld. 2G.
HS-012 637

MECHANISMS OF TIRE SOUND GENERATION
Goodrich (B. F.) Tire Co., G24000
For primary bibliographic entry see Fld. 2G.
HS-012 638

EFFECTS OF OPERATING PARAMETERS ON TRUCK TIRE SOUNDS
General Tire and Rubber Co., G12900
D. A. CorcoranSAE-720925
In HS-012 636

*Tire noise, *Truck tires, *Acoustic measurement, *Sound intensity, *Tire tread patterns, *Road surfaces, *Tire pavement interface, *Speed, *Tire loads, *Tire inflation pressure, *Tire wear, *Tire characteristics,

The A-weighted sound-level measurements of truck tire sounds are dependent on a number of variables. These variables are identified, individually considered, and their effects on the A-weighted sound level measurements of truck tire sounds are discussed. It is concluded that cross-ribbed tires produce sound of levels higher than that of circumferentially ribbed tires; a tire rolling on a smooth surface generates a higher sound level than would be produced on a coarse surface; the sound level produced increases with wheel speed; the sound level increases with a decrease in the axle height; as the tire becomes worn, the sound level may increase from 4 to 9 dB; doubling the number of axles, and thus the number of tires, increases the sound by approximately 2 dB; ambient temperature does not appear to influence the sound produced by truck tires; no significant difference was observed in the level of sound produced by tube and tubeless tires with similar tread pattern; and tire size did not influence the level of sound produced.
HS-012 639

CHARACTERISTICS OF TRUCK TIRE SOUND
Firestone Tire and Rubber Co., F12600
For primary bibliographic entry see Fld. 2G.
HS-012 640

SOUND LEVELS OF HIGHWAY TRUCK TIRES, PROPOSED SAE RECOMMENDED PRACTICE XJ57
Society of Automotive Engineers, Inc., S21600
For primary bibliographic entry see Fld. 2G.
HS-012 641

AN EXPERIMENT FOR RELATING OBJECTIVE AND SUBJECTIVE ASSESSMENTS OF TRUCK TIRE NOISE
General Motors Corp., G06600
R. K. HillquistSAE-720928
In HS-012 636

*Tire noise, *Truck tires, *Sound intensity, *Acoustic measurement, *Design of experiments, *Test facilities, *Test equipment, *Variance analysis, *Linear regression analysis, *Tire tread patterns,

An experimental test program conducted by the SAE Truck Tire Noise Subcommittee for relating objective and subjective assessments of truck tire noise comprised a series of designed experiments involving 6 trucks, 18 sets of tires, and 5 vehicle operating modes. The test runs were presented in random fashion to a jury situated alongside a highway. The subjective noisiness ratings and the A-weighted sound levels obtained verified the design objectives of the experiment and, further, correlated well with each other.
HS-012 642

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
Office of Administration
WASHINGTON, D.C. 20590
OFFICIAL BUSINESS
Penalty For Private Use, \$300

POSTAGE AND FEES PAID
NATIONAL HIGHWAY TRAFFIC SAFETY
ADMINISTRATION
517



CARNEGIE LIBRARY
AUG 24 1973
OF PITTSBURGH